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Some Features of the New Tax Law

Revenue Act of 1921 Affords Real Relief to Business—Apparently Unimportant Changes in Wording Significant

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AMONG the numerous changes made by the new tax bill signed by President Harding on Nov. 23, five stand out as of great importance from the point of view of the business man and the investor. These are:

(1) The abolition of the Excess Profits Tax as of the beginning of next year, coupled with an increase in the income tax on corporations at that time from 10 to 12½ per cent.

(2) The reduction in the surtax rates on individual incomes which comes into effect at the same time.

(3) The establishment, with the beginning of next year, of a new class of income to be known as capital gain, which will be subject to a maximum rate of 12½ per cent.

(4) The broadening of the definition of the "closed transaction," effective for the current year, which makes possible many exchanges of property for property without subjecting the gain to taxation.

(5) The recognition, beginning this year, of a net loss from one year's operation as an offset against any profits which may accrue in the two following years.

The first two changes, the repeal of the profits tax and the changes in the rates, have been the subject of wide comment but the other changes, being of a somewhat more technical character, have been less discussed and their significance less fully appreciated.

Excess Profits Tax Repeal

In spite of great pressure, Congress finally declined to repeal the profits tax for 1921, but did agree to abolish it thereafter. With it disappears the "personal service corporation," a special class established to care for certain corporations which it was desired to exempt from profits taxation. When the profits tax goes, the income tax rate on all net income of corporations rises from 10 to 12½ per cent. The change in the rate will cause corporations which make only moderate profits to pay slightly heavier taxes but the total tax burden on corporate income will be much lighter, the official estimates of revenue under the new bill calling for $1,030,000,000 from this source (ignoring back taxes) this fiscal year and only $695,000,000 for the next fiscal year, when the changes will be in force.

Reduction of Surtax Rates

The surtax rates on individual incomes are scheduled for reduction beginning with the first of next year. A comparison of the new scale with the old is difficult to make. It should be made clear, however, that the change affects small taxpayers as well as large ones. The maximum rates remain very high—50 per cent as compared with 65 under the old law. The 50 per cent rate applies to all income in excess of $200,000. The old rate which applied to the increment of income above $200,000. income was 60 per cent. Surtaxes in the future will not begin until the $6,000 point is reached and will be 1 per cent for income between $6,000 and $10,000. Under the old law, the surtaxes begin at $5,000 and mount by more rapid steps. There are also slight changes in the personal exemptions, effective at once. According to the revenue estimates these changes will not provide much relief for the individual taxpayers, for the Government expects to get $785,000,000 next year with the changes in effect as compared with $850,000,000 this year.

New Class of "Capital Gains"

The most revolutionary section in the new act is Section 206 which sets up a new division of income. After the first of next year, money made by individuals by selling or exchanging property "held for profit or investment" is subject to a maximum rate of 12½ per cent, instead of the regular rates which range as high as 58 per cent (normal plus surtaxes). This is hedged about by several restrictions. The individual may not take advantage of the permission to use the 12½ per cent rate unless he is willing to pay at least 12½ per cent on his other income as well. The property "held for profit or investment" must have been so held for more than two years and may not include property "held for the personal use or consumption of the taxpayer or his family," or property which properly is subject to inventory. It is not necessary, however, that the property be connected with his trade or business.

The reason for the adoption of some such section as this is plain, whatever one may think of the wisdom of choosing this particular method of meeting the situation. As everyone knows, many sales of property have been postponed or entirely blocked by the unwillingness of prospective sellers to take their profits when they would immediately become subject to heavy surtaxes. This, of course, handicapped business. The solution adopted was practically to wipe out the offensive surtaxes on profits from this class of transactions.

One anomalous result of the selection of this solution, however, is that under this new arrangement a dollar of profit made from property which has grown in value is taxed at the maximum only 12½ cents, whereas a dollar made otherwise may be taxed as much as 58 cents. For example, in the case of a bond bought at a discount and sold at a profit, every dollar of interest on the bond may pay a tax nearly five times as great as every dollar of appreciation in the value of the bond, a fact which is likely to effect profoundly future methods of corporate financing.

Much more could be said regarding the effects of this new section from the points of view of equity and of administration, but what is of particular interest here

is to point out the very substantial relief granted by it to investors in property which appreciates in value.

The advantage to the investor in property which is gaining in value, conferred by the section just described, is accentuated by the liberal provisions governing the "closed transaction" (Section 202). This has long been a troublesome section of the field of income tax procedure. When one exchanges property for cash, no question arises. The transaction is "closed" and one accounts for his gain to the tax collector. But when one barters instead of sells, receiving other property instead of cash for his property, very serious questions arise. There are sometimes differences of opinion as to the value of the property received which lead to disputes and litigation. The old law went so far as to say that, in the case of such trades, the property received was to be treated as cash "to the amount of its fair market value, if any" (with certain exceptions in the case of a corporate reorganization, 1918 Law, Section 202). The new law goes much further. It now states positively that no gain or loss on trades shall be recognized unless the property received on the trade "has a readily realizable market value." The phrase, "readily realizable," adds a new and liberalizing element.

Even more important, however, are the exceptions made to the general rule. Even though the property received has such a "readily realizable market value," one need not account for the gain in certain cases. This is one:

"When any such property held for investment, or for productive use in trade or business (not including stock-in-trade or other property held primarily for sale), is exchanged for property of a like kind or use."

How the Treasury will interpret this section is, of course, as yet unknown, but it would be a very narrow interpretation which would exclude exchanges of bonds for bonds, or real estate for real estate. In other words, so long as one "barters" or "trades" his property for other similar property instead of selling it for cash, he need not account for his gains to the Treasury for tax purposes. Even if he does sell for cash, as has been noted above, he is subject to a tax of only 12½ per cent.

The provisions governing corporate reorganizations and sales of property to corporations are also greatly liberalized so as to make it unnecessary to report main gains for taxation.

Net Losses

With one minor exception included in the 1918 law, it has been the practice since the beginning of income taxation in this country, to treat each year as a unit and to refuse to permit the fact that one has lost money this year to affect the amount of profit he must report the following year. Each accounting period has been carefully "insulated" from other accounting periods. This practice has worked much hardship and the new law breaks away from the old precedents by inserting a provision, effective for 1921 (Section 204, with a restriction on mines), which permits a net loss suffered in one year to be offset against any net income realized in the two next succeeding years. In other words, losses may be used to blot off subsequent gains but losses are "outlawed" for this purpose after the expiration of two years.

The new law contains many other new provisions which it would be interesting to discuss, did not the limits of this article prevent it. Such changes include the new rule regarding gifts, which makes the recipient, if he sells a gift, account for the gain in the value of the gift before he received it [Section 202 (a) (2)], the section aimed to prevent "wash-sales" to establish losses [Section 214 (a) (5)]; the provision covering cases where property is involuntarily converted into cash [Section 234 (a) (14)] and the modifications in the various special taxes.

It has been possible to stress here only the most important departures in the new statute. Careful examinations by the business man and the investor will reveal the fact that it contains provisions, aside from the repeal of the profits tax and the changes in the rates, which will yield him very substantial relief from the burdens of war taxation under which he has been struggling for the past five years.

The Open Door Policy

By C. J. Morrison

Many modern businesses have grown so large that the personal contact with employees which the executives of a small concern can maintain becomes impossible, and many substitutes have been tried with varying degrees of success. Some of the substitutes are very elaborate schemes involving shop conditions, employees' representatives, so-called "houses of representatives and senators," etc. Many of these arrangements have produced good results, but in the final analysis nothing can replace completely the personal contact and the establishment of a feeling in an organization that each individual employee will get a square deal. There is also the great advantage to both the management and the employees that each employee is always treated as an individual, is free to make his own arrangements with his employers and in the event of a grievance, can present his own case to the management.

The Place For Diplomacy

At the beginning of the war a concern employing 3,000 persons composed of all classes from negro laborers to the most highly skilled artisans, and both men and women in the ratio of about five to one, placed all matters pertaining to the employees in the hands of one executive who reported directly to the president, and inaugurated what was known as "The Open Door Policy." By this was meant that the office door of every executive was always open to each employee as an individual, but that no employee would be received as a representative of others nor would any outsider be received as a representative of the employees. Matters were supposed to be taken up first with a foreman, then with the department superintendent, next with the supervisor of labor (the executive in charge of all employee relationships) and finally with the vice-president or president; but there was no rigid adherence to this routine and sometimes an employee went first to the president. Of course in such a case considerable diplomacy was required on the part of the president to handle the situation without creating friction in the organization, but a man qualified to be president of such a concern must have such diplomacy.

The supervisor of labor had complete charge of all matters pertaining to every one on the pay roll except the executives of the company. He did the hiring (after the preliminary questioning of applicants had been performed by assistants), set the rates of pay, established the hours of work, made the working rules, arranged

for promotions and transfers, gave discharges when necessary, adjusted all grievances, etc. The fact that no one could be hired or discharged except through the supervisor of labor was one of the important factors in the success of the work. At first considerable objection was raised to the discharging feature as it was argued that to take the power of discharging away from the foremen would weaken their control over their men, particularly so in the case of the negroes, but such did not prove to be the result as the employees soon learned that a just cause for discharge would receive immediate action. On the other hand the foremen learned that tyranny and fits of temper were not tolerated. Of course in the early days of the scheme there were cases where sufficient friction was engendered so that transfers had to be made, but after a little while these troubles died out and the net result was almost no discharges and few transfers, except in the way of promotions.

A classification of occupations was made and graded rates of pay established for each which were known as A, B, C, D, etc. Employment was always made at the lowest grade and promotions given according to merit as shown by the records kept for each employee. These records were watched very closely so that promotions were usually made before they were asked for. In fact, in most cases where they were asked for, they were not deserved and the employee was shown what he must do to receive more pay. The A-B-C classification had a queer psychological effect in that no one wanted to be rated anything except class A. This condition was not altogether due to the difference in the rates of pay, but was caused largely by pride, and there were a number of cases where employees asked to be rated class A even though they would still receive the pay of a lower class.

The Personal Contact

However, the methods described above were simply a means to an end and the real work of the supervisor of labor was to supply the personal contact between the management and the employees. This was accomplished by a continuous round of visits to all departments, by eating in the company's restaurants, of which there were four, by attending or by taking part in all activities of the employees, by riding to and from work with them, in fact by generally mixing with them. He soon knew practically all by sight and a large proportion of them by name. Nearly all soon reached the point where they would talk quite freely and many riffles were straightened out before they became troubles. The talks did not stop at company business, but before long a number were bringing up all their outside difficulties and seeking advice on subjects ranging from what to give the baby for colic to how many Liberty Bonds should be purchased.

When the influenza epidemic swept the country the supervisor of labor, as the representative of the management, provided food, fruit, medicines, nurses, doctors, and undertakers for the employees and their families where assistance was needed. The expense of this aid, was of course borne by the company. All of this was simply an application of the Golden Rule to business.

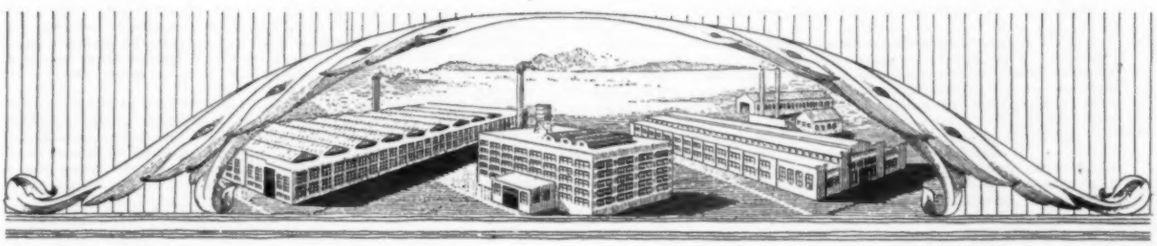
In order to establish a more personal relationship with the women than could be maintained by a man, a very capable woman was employed as an assistant to devote her entire time to the women. By acting under instructions from the supervisor of labor and by holding daily conferences with him, this assistant soon had as cordial relations established among the women as with the men.

Advantage was taken of this close personal contact with the employees to explain to them the policies of the company, its troubles, its prospects of profits, its standing in the industry, its reputation, its service to the Government, and particularly to explain the "reason why for everything."

The Direct Results

That these methods were successful is shown by the results obtained. Although this industry was located in a labor market which was torn by strikes and discord, it had no labor troubles of any description, had all the employees it needed and had a labor turnover remarkably low for the location and time. The results are particularly noticeable when the further fact is known that although much of the product of this company was a vital necessity to the Government in the war, the remuneration carried very little profit and the company therefore could not compete in wages with many of its neighbors who were working on a cost-plus basis. Employees stayed with this company, not for a mere money consideration, but because they liked to work where they were treated like human beings and where they felt that each one received a square deal.

As many know the success of the open door and personal contact methods in small establishments and bemoan the fact that they are not applicable to a large business, it may be well to point out the fact that the methods have been successful in a number of instances besides the one cited here. In a large industry it is hardly possible for the regular executives to do this work and it is therefore necessary to employ someone to devote his entire time to keeping open the door and to applying the personal contact. However, a word of caution is necessary. This is not a job for an amateur, for a poor relation or for any other man who can be hired for a low salary. A broad gage man of wide experience must be secured and his salary may approximate that of the general manager, but the services of the right man will pay large dividends.



PRODUCTION

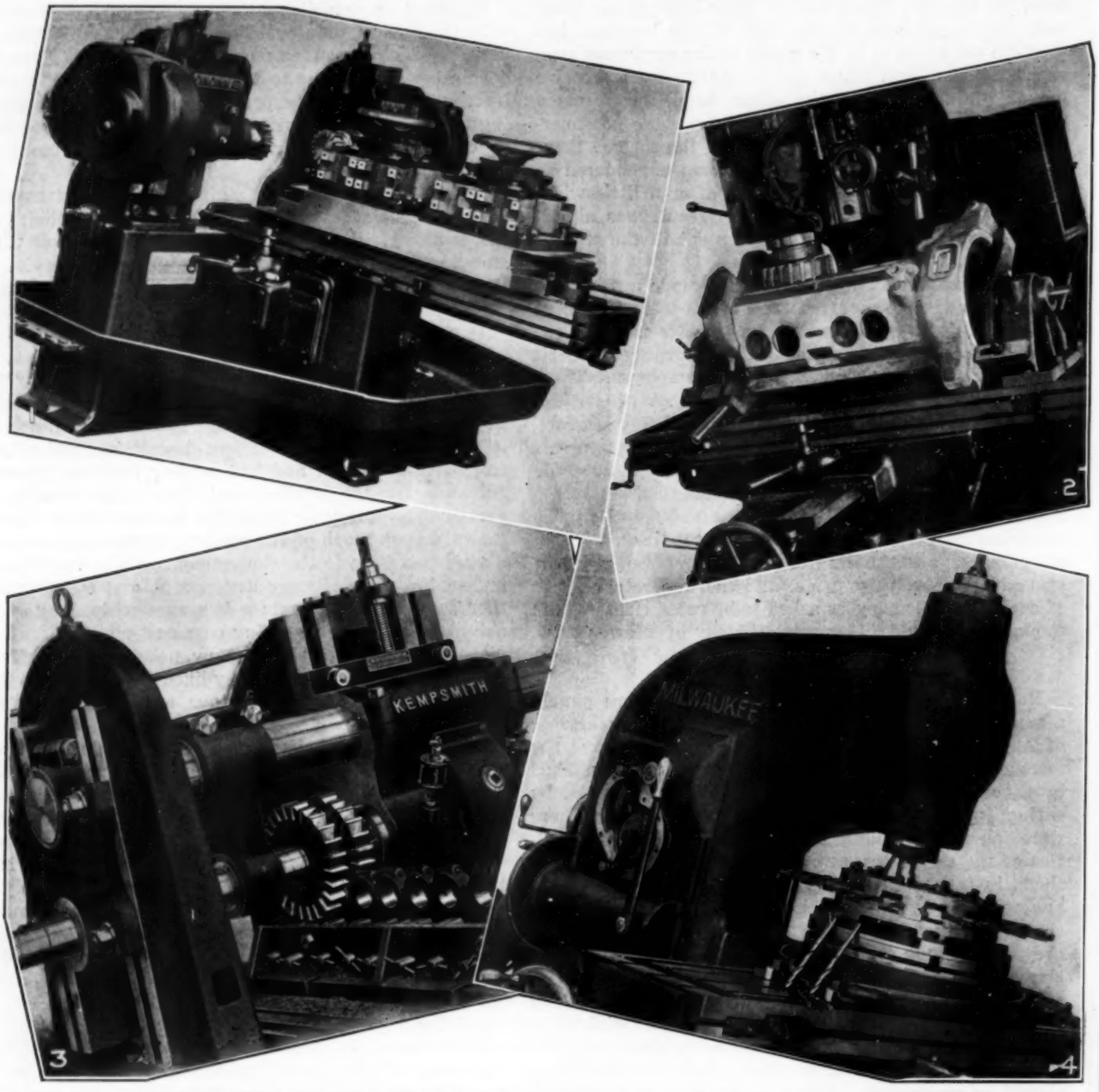


Fig. 1. The Cincinnati duplex automatic milling machine shown here is milling the feet of small electric motors. There are two fixtures each holding eight motor frames. The table has an automatic fast traverse between cuts, so that there is no "cutting wind." One fixture can be unloaded and loaded while work in the other fixture is under operation. The production is 120 frames per hour.

Fig. 2. The Cincinnati high power milling machine to be seen in this picture is milling the joint faces on an aluminum crankcase. A single piece is held in an indexing fixture mounted on trunnions. Two joint faces at 90 deg. to each other are milled in 9.85 minutes.

Fig. 3. This Kempsmith No. 33 production milling machine is straddle milling cast-iron gear-box levers. Production, including loading and unloading the fixture, is 120 pieces per hour. The bosses of these levers were formerly faced in a lathe and the time was 4 min. each. The saving by milling is 87½ per cent.

Fig. 4. Here is a Milwaukee vertical milling machine fitted with a rotary table and multiple holding fixtures. The operation is milling the tangs on taper-shank twist drills. The production on drills with No. 3 taper shanks is 750 per hour. As drills can be removed from the fixtures as fast as finished and others put in place, the operation is continuous.

IN PICTURES

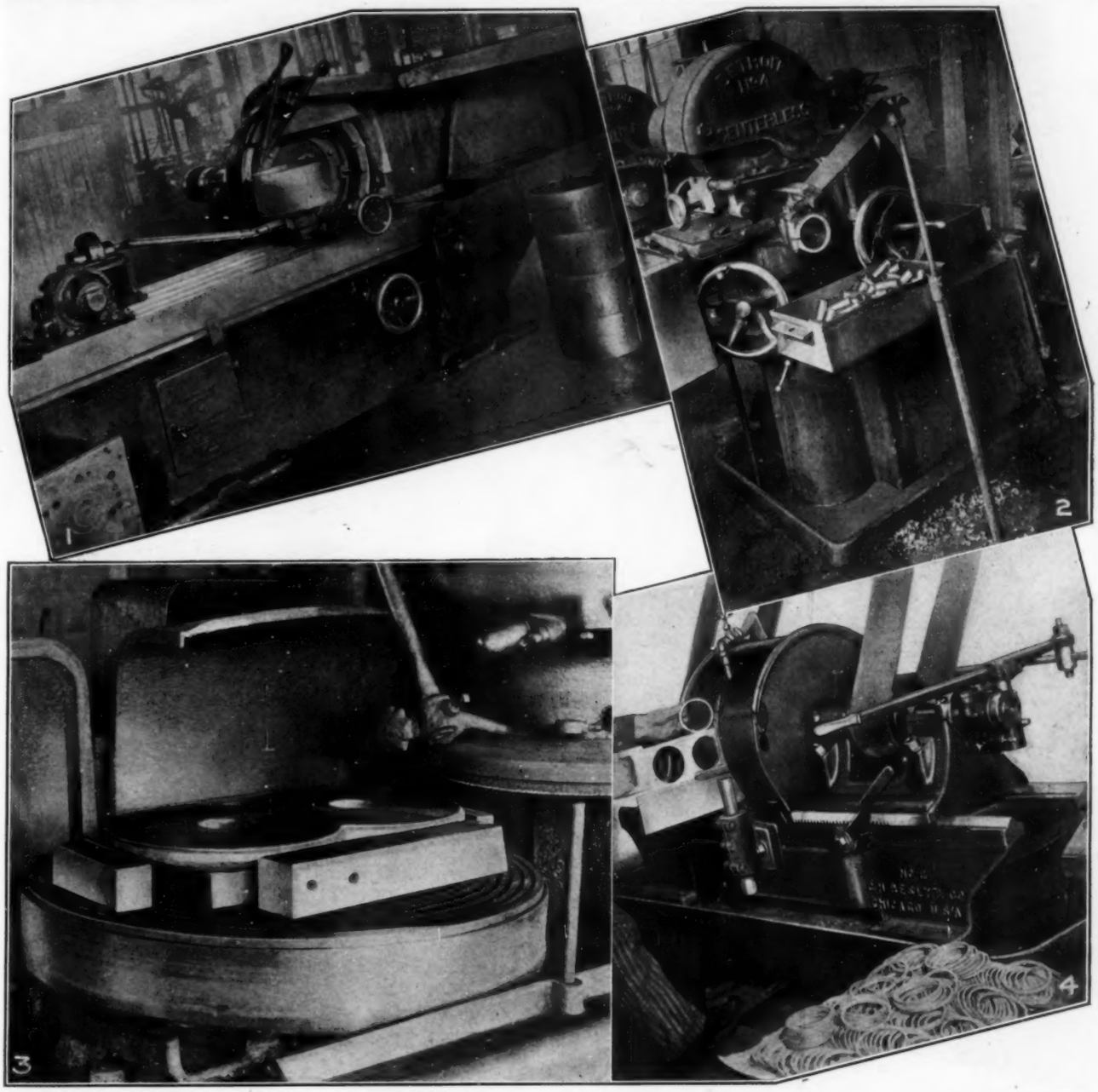


Fig. 1. Pulley rims are thin and apt to be chilled, so that turning in a lathe is a slow operation. Machining pulley faces by grinding on a Diamond face-grinding machine is shown in the accompanying illustration. By varying the location of the work in relation to the wheel plane, pulleys may be ground with either straight or crowned faces.

Fig. 2. Precision-grinding cylindrical work not held in centers, is somewhat anomalous—but it works—and the length that can be ground is almost unlimited. The illustration shows a Detroit centerless grinding machine at work on piston pins, which, according to the builder's claims, it turns out at the rate of 140 or more per hour.

Fig. 3. In this illustration is shown a Blanchard rotary grinding machine surfacing one side of a cast-iron cylinder head. The work is held by a magnetic chuck and ⅛-in. of stock is ground off. The production is six pieces per hour.

Fig. 4. The sides of automobile piston-rings must be parallel and of the required thickness within close limits. On the Besly wet ring-wheel grinding machine shown herewith, piston rings can be ground on both sides at a rapid rate, the variations not being greater than 0.0015 in. in thickness nor 0.001 in. from parallel. The wheels run in opposite directions and at slightly different speeds, giving the rings a slow rotating movement.

PRODUCTION

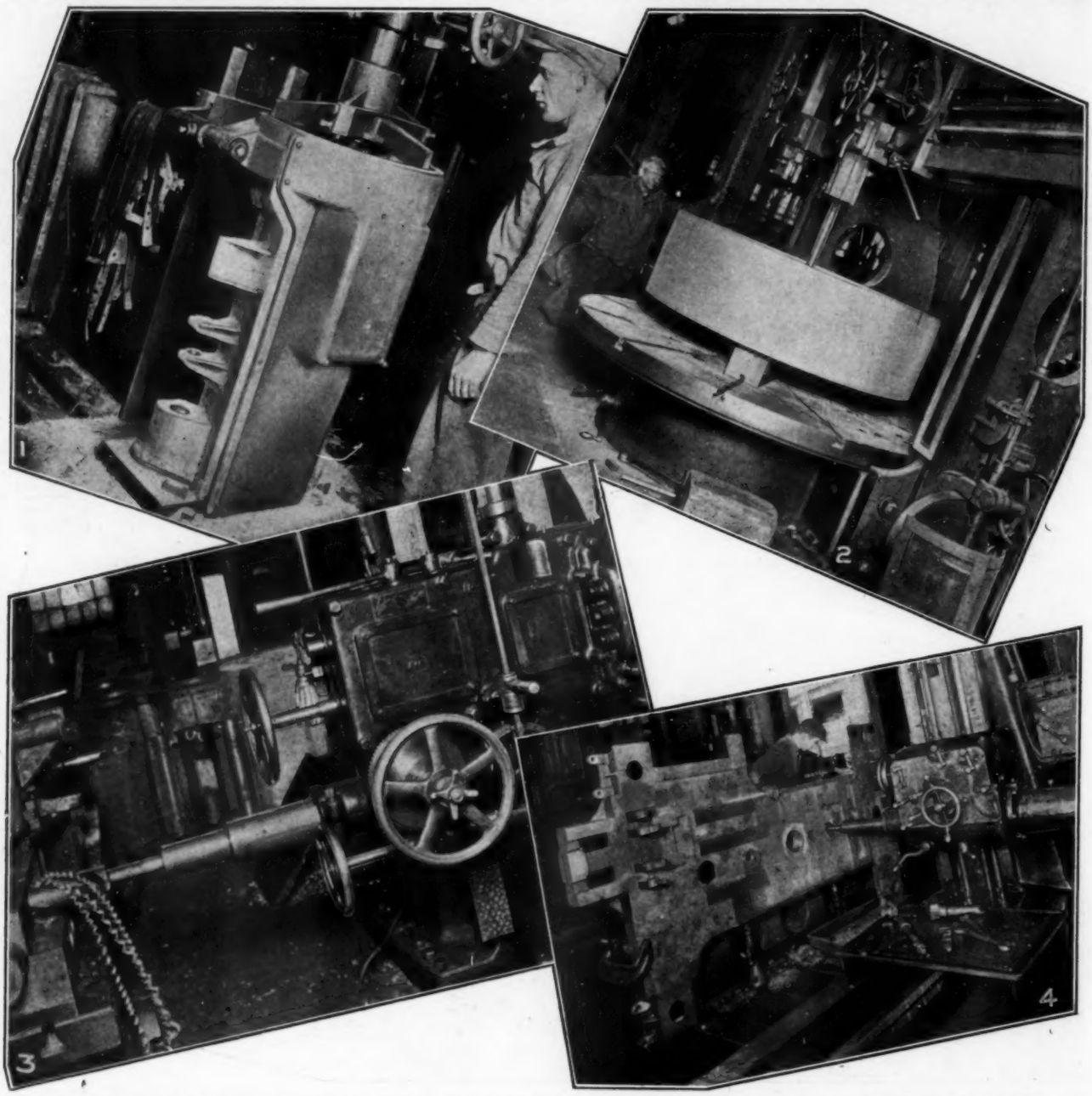


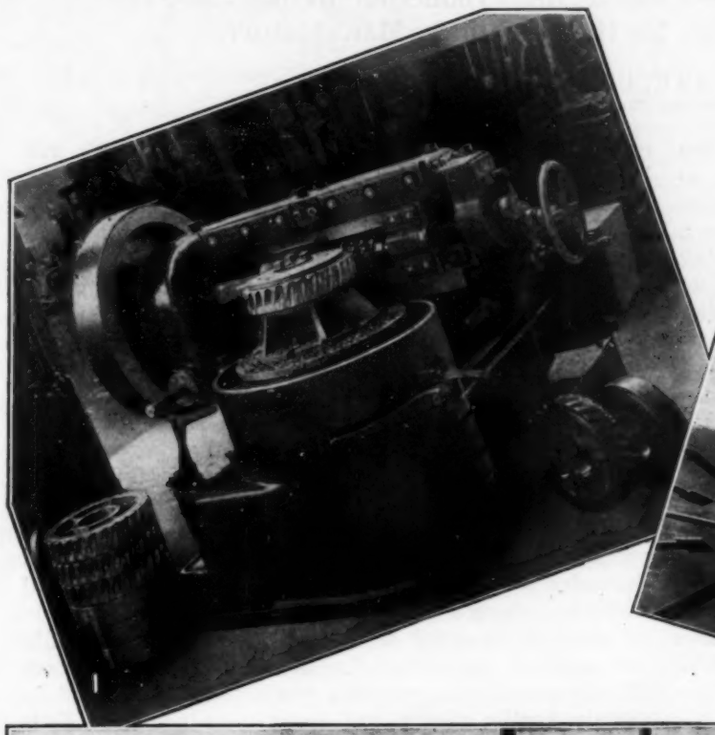
Fig. 1. This Baker boring and drilling machine is boring and facing the flywheel housing on the crankcase of an automobile engine. The work table has been removed from the machine and a special clamping fixture attached to the base and column. It is only of late years that drilling machines have been built heavy enough for such work.

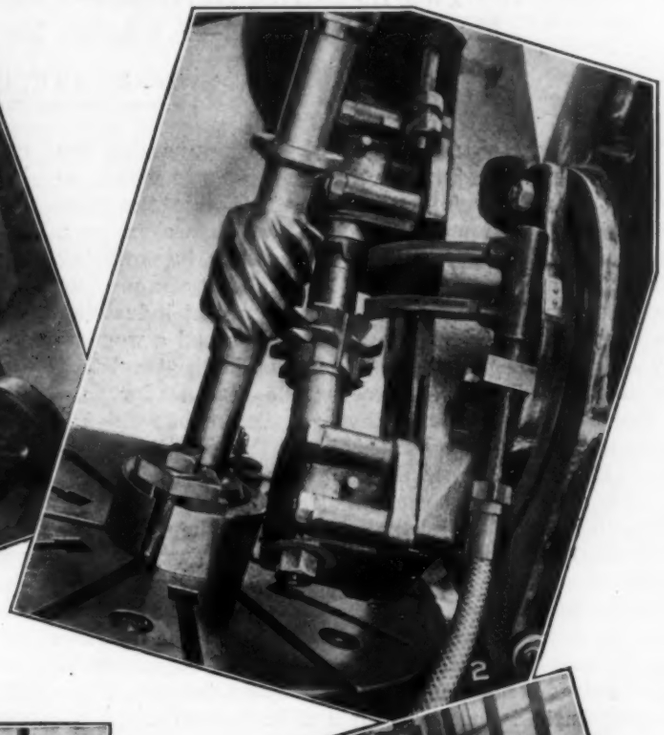
Fig. 2. A Niles vertical boring and turning mill is here shown machining a 70 x 20-in. pulley. Not only can the work be more conveniently handled in machines of this type than in a lathe, but it can be done in less time. While the hole in the pulley is being bored by the bar in one head, the face is being turned by a tool in the other head.

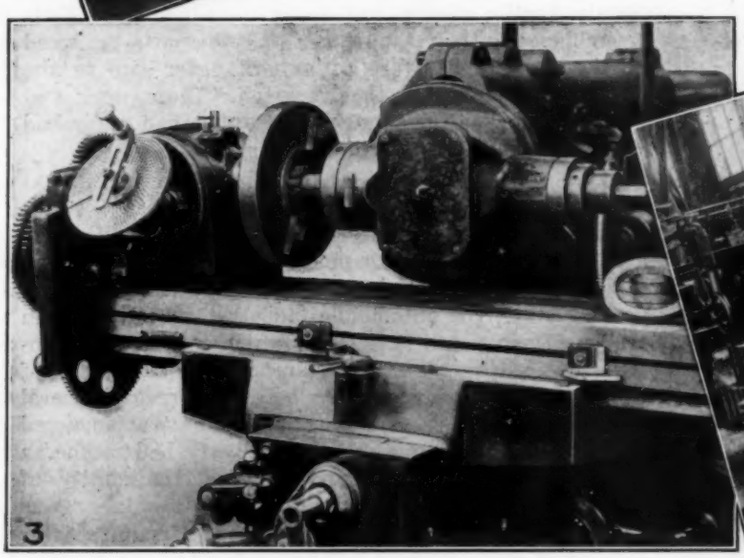
Fig. 3. Here is a Pawling & Harnischfeger horizontal boring machine drilling 3-in. holes from the solid in cold-rolled steel. To get production on work of this kind, the machine must be massive and rigid. The chips coming from the drill are evidence that the machine is standing up to the work.

Fig. 4. Boring a series of holes in large work and keeping them all in alignment means that the work must not be moved after it has once been set. In the Rochester horizontal boring machine illustrated herewith, the work is stationary while the spindle head is moved from the location of one hole to that of another.

IN PICTURES







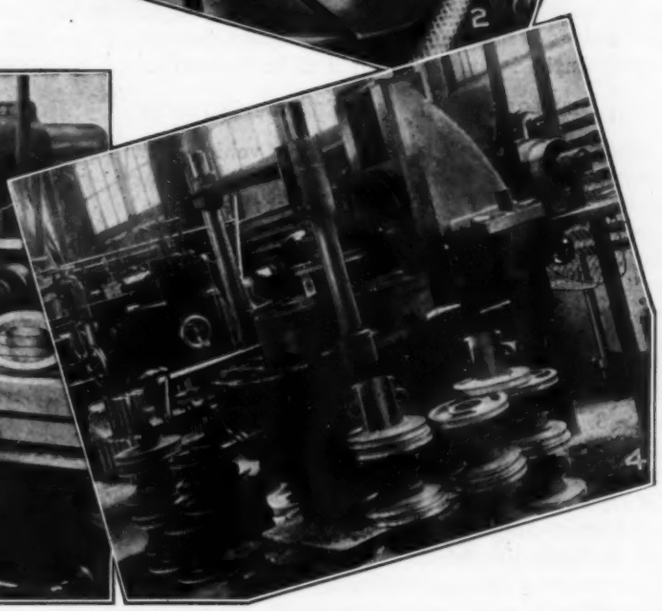


Fig. 1. When wormwheels are wanted in large quantities, a generating machine such as the Gould & Eberhardt machine shown here is capable of high production without loss of accuracy. The tapered hob starts in with a light cut, gradually getting heavier as the wheel revolves until the teeth are finished, without preparatory gashing. The wheels shown are 1½-in. circular pitch, have 28 teeth and the cutting time is 48 min. each.

Fig. 2. The hobbing machine, properly equipped, will do a great variety of work from gear cutting to cutting multiple key seats. The Gould & Eberhardt machine shown herewith is hobbing a seven-thread worm with a hob of unique design. The worm is 4.12 in. in diameter, 1½-in. pitch and 5-in. face and was cut in 70 minutes.

Fig. 3. In hobbing internal threads, the thread on the hob has no lead, the hob is longer than the threaded part of the work and the operation is completed in practically one revolution of the work. The Kempsmith milling machine shown here is fitted with a special attachment and is hobbing threads in steel collars. The production is eighteen an hour.

Fig. 4. The gear hobbing machine shows up at its best in comparative accuracy in the manufacture of wormwheels. The Farwell hobbing machine illustrated herewith is hobbing wormwheels, including the gashing, in 30 min. each. Formerly 2½ hr. were required when the work was done in a milling machine.

Are Automobile Manufacturing Methods Applicable to the Textile Industry?

How the Two Industries Developed—Contrasting Production Methods and the Machinery Involved—A Chance for the Machinery Manufacturer

By DOUGLAS T. HAMILTON
Fellows Gear Shaper Co.

THE depression through which we are passing has focused our minds on many subjects to which we have not given very close attention in the past. Economy of production, for instance, has taken on a new meaning—and justly so. It is only by lowering production and sales costs that the final cost of a product can be reduced. In looking at the prominent industries, we see that the automobile business has had a wonderful and phenomenal growth, and it is only natural that we should endeavor to discover the reasons for this.

One of the reasons is that the automobile filled a want and filled it well, but this is not the most important one. If automobiles could not have been produced at a price at which a large number of people could purchase them, the demand that necessitated the production of 9,000,000 automobiles in a comparatively few years could never have been created. We necessarily come to the final conclusion that methods of production have been largely responsible for this growth. The question is, can these methods which have proved so successful in the automobile business be adapted to one of our largest basic industries—the textile industry?

Development of the Textile Industry

Long before the power-driven vehicle was ever thought of or contemplated, the textile industry had reached a position of no mean proportions. In fact, it is our oldest industry, dating back thousands of years. The fabrication of cloth of great beauty was an art that was well developed long before biblical times; but the advent of machinery for the weaving of cloth and the spinning of yarn is of more recent development. The first development in the textile industry of importance was the invention of the fly shuttle by John Kay in 1733. This was followed by other improvements by such inventors as James Hargreaves, Richard Arkwright, Samuel Crompton, Edmond Cartwright, Samuel Slater, Francis C. Lowell, Alvin Jenks and many other well-known names in the textile industry. The ring spindle frame invented by Alvin Jenks was a great step in advance in the production of modern cotton thread. This process, with improvements in machine construction and design, is in use today. If we study the history of the textile industry, we can learn considerable, not only in regard to machine design and the adaptation of ingenious mechanical movements, but we will also find that this industry has been responsible for some of our present-day economical production methods.

Great credit is due to the designers of textile machinery and equipment for the skill and ingenuity that they displayed; but it must be admitted that the developments in this industry have not kept pace with some of our modern industries. The methods of spinning cotton thread, as an example, have not improved in the last fifty years. Larger machines have, it is true, been built, but the production per spindle has not been greatly increased, some of the reasons for which will be given later.

The production of textile machinery, in a sense, preceded the development of tools for producing machinery, and certainly was in advance of the machine-tool industry. In fact, there are now certain machine tools which were later developed solely for use in this industry. The textile-machine manufacturer, however, largely produced his own machine tools and equipment used in the production of textile machines, and naturally, also developed his own shop methods of manufacture.

Examples of the ingenious methods that were adopted have spread out into other industries including the manufacture of agricultural machinery, shoe machinery, etc., that were developed at an early date. In the production of textile machinery, manual skill and dexterity were developed to a high extent, and special machines, though crude in design, were used entirely in place of standard machine tools, as such tools did not exist at that time. In fact, progenitors of some of our present-day machine tools are to be found in certain textile plants, but these machines bear little resemblance to their offsprings; still, the parts produced on these machines were of a high order due to the dexterity and skill of the workmen. Piece work and what we know as the single-operation method really had its inception in the textile industry.

Development of the Automobile Industry

The automobile industry started only about 25 years ago and has had a much more rapid growth. Instead of taking fifty or one hundred years to develop to its present state, the automobile industry has advanced in ten or fifteen years to a stage which is generally conceded to eclipse all other industries in cheapness of production of high-grade products. There are several reasons why this is so. The automobile was invented at a time when the machine-tool industry had reached a stage of considerable importance, and the ability of machine-tool builders as designers of machinery was well recognized; hence, the automobile manufacturer instead of going it alone and producing his own machinery, called in the assistance of the machine-tool builder. Together they worked out production problems, the results of which we see today as one of the highest developments in manufacturing methods. In fact, one of our most conspicuous examples of interchangeable manufacture, and the one which represents the highest grade of goods for the least money, is our best example of what co-operation between machine-tool builder and manufacturer can accomplish.

It has been the boast of one of the largest manufacturers in the automobile industry that he could pay the highest wages in the industry and yet produce the cheapest goods, the reason for which was the productive capacity of the equipment and the application of the

well-known principle of multiple operation work. Such results, of course, could not be secured without the use of special and highly-developed machine equipment. There is little question at all that the automobile industry would not have reached its present stage had it not been for the development in manufacturing methods; and it certainly is a fact that it would not have been possible to produce 9,000,000 automobiles in a period of less than ten years, unless present-day improved manufacturing methods had been adopted.

Are These Methods Applicable to the Textile Industry?

The question is, can the methods used by the automobile manufacturer be applied to the use of the textile-machine manufacturer? If we compare these two industries, we see quite a difference. In the first place, the textile-machine manufacturers, except in a few cases where their equipment has become modernized, are using special home-made machinery of crude design and construction. These machines are adapted to produce one piece at a time, but doing it with such rapidity that the cost per piece is small. The automobile manufacturer, on the other hand, also is using a specially designed machine tool capable of making a large number of pieces at one time. His equipment costs him considerably more than does that used by the textile-machine manufacturer, but his unit costs are lower for the reason that his labor cost is lower. In other words, we have two extremes. We see, in one case, the use of crude equipment and highly-skilled workmen, and in the other case, the use of expensive and well-developed equipment and the employment of comparatively non-skilled workmen.

It is generally conceded by those who have made a study of manufacturing methods that the future lies along those lines that the automobile manufacturer is following, for the reason that labor costs will never be reduced to the same rate that they were 25 or more years ago, and that any improvements which are made in reducing manufacturing costs must be on the side of greater efficiency of the workmen, and the use of better machines and machining methods.

Textile Versus Automobile Industry

Regarding the question of design and more particularly the application of gearing, we find a remarkable difference between the advance in the textile and automobile industries. The automobile manufacturer should be given the credit largely for the present high state of development in the production of gearing; also the materials used in the production of gears. High-grade alloy steels were developed solely for use in automobile manufacture; cast iron, except in a very few cases where it best serves the purpose, has been practically eliminated in favor of forgings, so that an automobile of great strength and of light weight can be produced today at a very small cost indeed. It is certainly clear that it would have been impossible to reach this stage with the materials that were in existence at the time that the automobile was developed, and it is also equally a fact that the automobile industry has made the best use of present high-grade steels in the production of automobile parts.

If we look at the textile industry, we see that cast-iron parts predominate, and particularly for gears, necessitating the use of heavy bulky castings, the gears being of coarse pitch and generally extremely noisy. When we get down to the lighter equipment such as cotton-spinning and roving machines, we see the parts lightened up somewhat, but still made from cast iron. In some cases the teeth are not even cut, but are cast. It might be argued that no great strength is required in such gears, especially on light machinery such as spinning and roving machines. This, however, is all the more reason why the lighter design could be adopted and higher speeds used. At the present time, spinning-machine spindles seldom exceed 10,000 r.p.m. and are belt-driven, whereas with properly cut and designed gears and properly designed spindles, speeds as high as 20,000 r.p.m. could be used. Here we see that production would be practically doubled just by one step in advance. The question of floor space also seems to have been overlooked; with gear-driven spinning frames, a possible saving of over 50 per cent could be effected. The machines could be more compactly and rigidly made and capable of producing a great deal more work in half the space.

There are many other cases in the textile industry where the methods developed by the automobile manufacturers could be applied with equal success. The use of better materials and improvements in machines and construction are some of the most important.

The Need for Better Blueprints

By Martin H. Ball

The making of blueprints is one of the many operations in which careless or poor work may lead to very serious and costly mistakes, and it is the writer's belief that in many manufacturing establishments sufficient care is not always exercised to insure against such losses. The care and extra expense necessary to secure faultless work in this respect would be far more than offset by the gain in time and accuracy to be obtained by the use of clear blueprints.

Many firms go to considerable expense to protect their prints from injury in the shops by mounting them in various ways; but they continue to make hazy and faint prints which compel those who use them to take extra time in reading them. What is still worse, it may lend them encouragement to take chances by providing them with an alibi if they wrongly read figures or dimension lines.

Lightly penciled tracings on paper and wrinkled and worn cloth tracings are sometimes used, both of which are difficult to make readable blueprints from; but the lack of thorough washing is responsible for the greatest number of poor prints and this particular trouble seems to be more common on prints made on blueprinting machines than on those that are made by hand.

It would seem that in some of these machines the washing capacity is hardly equal to the printing capacity and, as the printing capacity determines the amount of production, the washing process is cut somewhat short and the prints suffer accordingly. This difficulty can usually be remedied without lowering the production by increasing the volume of water used.

Another common cause of poor prints is incorrect time of exposure, which can only be corrected by close attention to the work coupled with sufficient knowledge and experience to understand the adjustments necessary to meet the variations in the light and in the printing paper.

[The samples submitted by our correspondent are too awful for reproduction.—Ed.]

Manufacturing Operations on Milling Machines

Special Toolholders for Facing Four-Step Cones—Fixtures and Tools for Machining Milling Machine Heads—A Unique Angle-Facing Fixture

BY ROBERT MAWSON

THE tools and operations described in this article are some of those used by the Becker Milling Machine Co., in the production of the various parts that are necessary to the manufacture of their products. In Fig. 1 is shown a set-up of four tools arranged for machining the steps on an upper feed cone for a milling machine. This cone has been previously chucked and the central hole drilled and reamed to 1.125 in. The tools used are solid and of the round-nose type, as shown in Fig. 2. The toolposts are special, each being fitted with two screws so that the set-up will be maintained under a heavy cut if necessary.

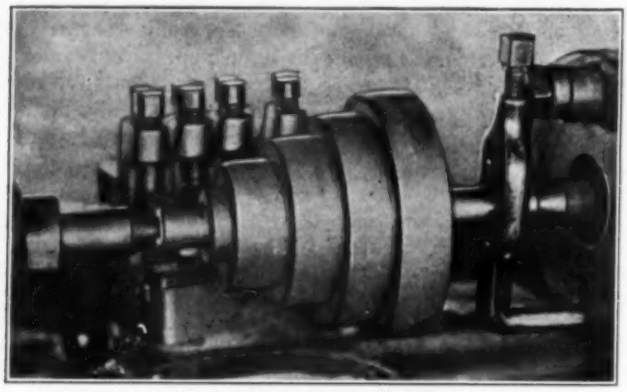


FIG. 1. TOOL ARRANGEMENT FOR FACING FOUR-STEP CONE

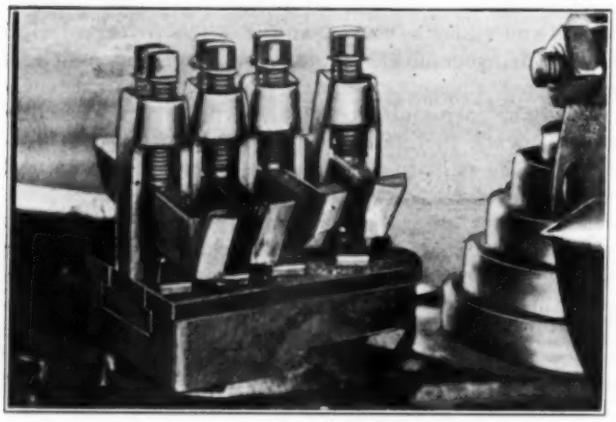


FIG. 2. SPECIAL TOOLHOLDER

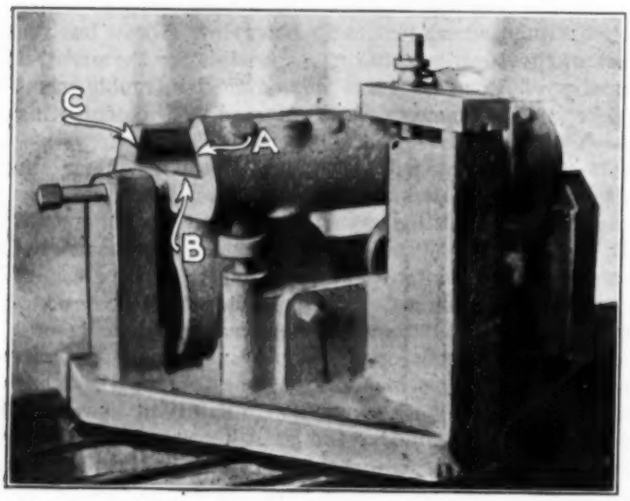


FIG. 3. FIXTURE FOR MACHINING MILLING MACHINE HEADS

A head such as is used on one size of a vertical milling machine, together with the fixture in which it is held for the first milling operation, is shown in Fig. 3. This operation is milling the surfaces *A*, *B* and *C* for which two different sets of cutters are used, the cutters in one set being angular, for milling the 50-deg. dovetails. An expert job of grinding is required on these cutters, as the surfaces and angles are held to very close limits, as shown in Fig. 4. Fig. 5 shows the fixture with the casting removed. At *A* can be seen two of the four hardened steel pins on which the casting rests. Screw *B* is tightened, forcing the casting back against the right-hand vertical wall of the fixture which acts as a stop, and the four knurled-headed screws *C* are tightened up under the body of the casting to support it. The straps *D* are then fastened down, holding the piece securely for machining.

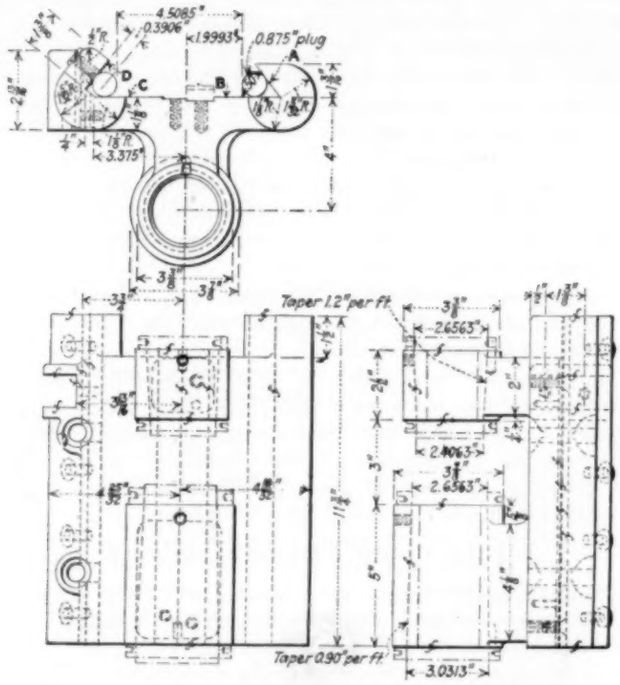


FIG. 4. HEAD FOR VERTICAL MILLING MACHINE

By referring to Fig. 4 again, it will be seen that the two spindle bearings are bored tapering, the small ends of both being toward the center. This operation is performed on a Gisholt lathe, using the fixture shown in Fig. 6. This fixture is centered by means of a raised register at the rear of the fixture-flange, which fits into a recess in the faceplate of the machine. The fixture

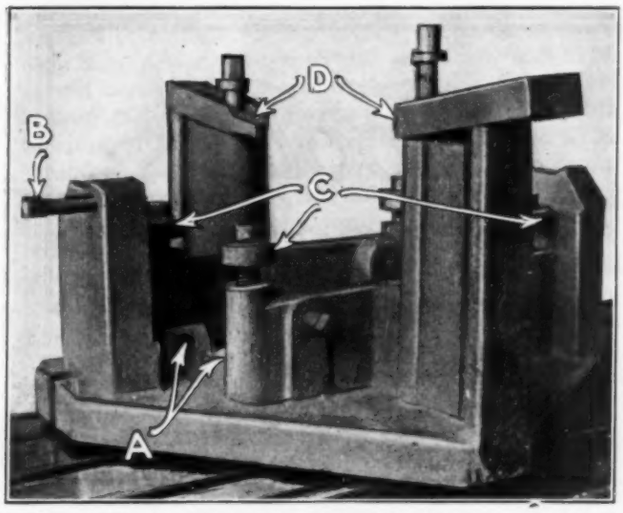


FIG. 5. FIXTURE WITHOUT CASTING, SHOWING MANNER OF OPERATION

with the casting removed is shown in Fig. 7. Two hardened steel dovetail blocks are fastened in the base of the fixture as shown at *A*. The casting to be machined is slid on over the ends of these blocks, which are arranged to fit the dovetail in the casting. The casting is pushed back against the stop *B* and held by the two clamps *C*. The two screws shown at D are used to force the dovetail on one side of the casting firmly against one of the hardened plates to insure correct alignment. In order to finish the spindle holes to the desired accuracy, they are hand-reamed after machining, the tools for this operation being shown in Fig. 8. The tapered guide bushing *A* is first slid into the lower bored hole as shown, and the upper hole hand-reamed, the hole being tested with a tapered plug-gage until the correct size is obtained. The casting is then reversed and the operation repeated, using the reamer shown at *B*, a similar plug-gage being employed for testing the hole.

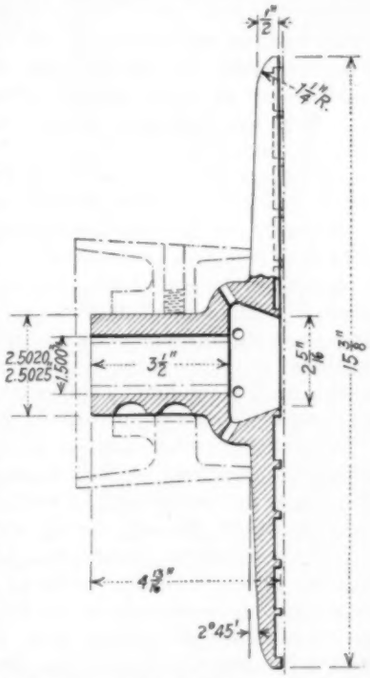


FIG. 9. FRICTION DISK FOR BECKER MILLING MACHINE

The friction disk shown in Fig. 9 is faced in an engine lathe, as shown in Fig. 10. The hole has been bored and the flat surface faced in a previous operation, the next operation being to face the back side at an angle of 2 deg. 45 min., as shown on the drawing in Fig. 9. Referring to Fig. 10, the arm *A* is fastened rigidly to the rear of the toolslide, the arm being made with a slotted end in which the hardened steel roller *B* is held. The adjustable taper bar *C* is clamped to the shears of the lathe by the large bolt *D*, being made in two parts so that the upper section can be swiveled to the angle desired and held in position by the two screws *E*. When the crossfeed is thrown in with the tool feeding outward, the roller runs along the edge of the taper bar, moving the carriage slowly in a longitudinal direction thus forcing the tool to follow the inclination and facing the work at the angle to which the bar is set. This arrangement can be adapted to a number of similar operations.

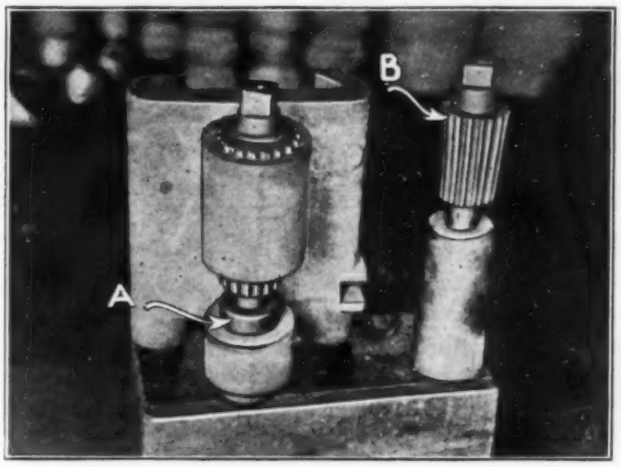


FIG. 8. REAMERS AND GUIDE-BUSHINGS

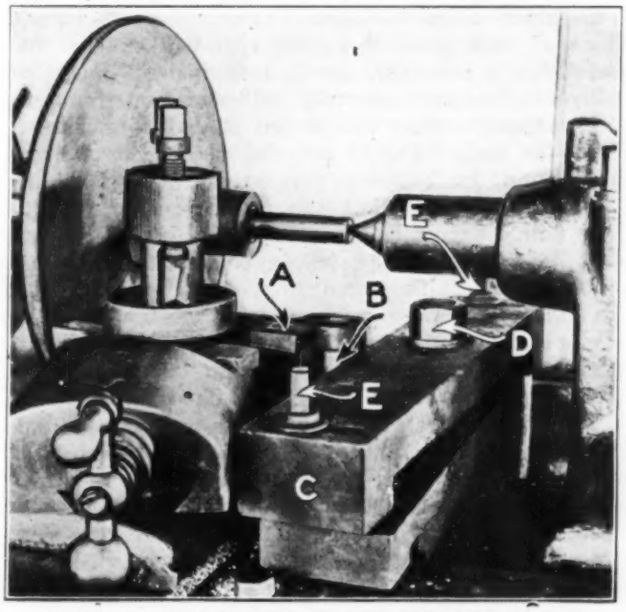
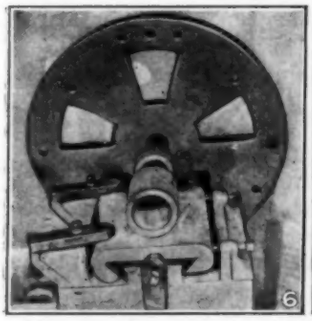


FIG. 10. LATHE FIXTURE FOR ANGLE-FACING



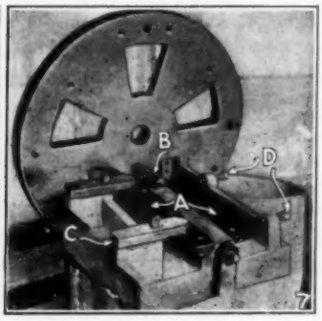
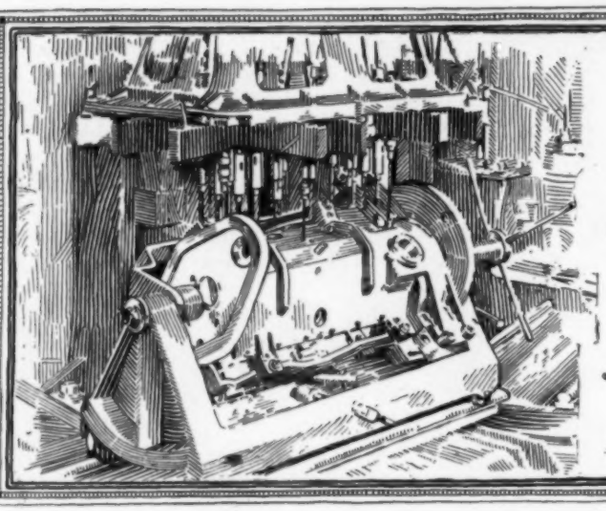


FIG. 6. HEAD READY FOR BORING. FIG. 7. FIXTURE SHOWING DOVETAIL SLIDES



Tool Engineering

By
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President and Chief Engineer
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Turning Tools for Turret Lathes—Factors To Be Considered in Designing Tools—Use of Back Rests—Construction of Toolholders—Arrangement of Cutting Tools

IN all kinds of production work, the machine furnishes the power and applies it in various ways. The tools, however, do the actual work, removing the metal and finishing the surfaces as determined by the "set-up." Any machine without tools is of little use in the production of metal parts. If the tool equipment is not well designed and proportioned for the work it has to do, the machines cannot be operated at maximum efficiency, and as a consequence the production will suffer. To obtain high production, the tool equipment must be intelligently designed, carefully built and properly used.

Many factors affect the design of tools for turret lathes—the material to be cut, the method of holding, the amount of stock to be removed, the length and width of the various cuts and the accuracy required. Many of the points cannot be covered fully in general notes, but will be treated in detail in connection with the specific examples illustrated.

(1) Material to be machined: In designing tools for any sort of cutting, the material which is to be cut naturally has an effect on the design. The shape of the work and its fragility are also important factors. The cutting requires tools which are properly ground for the kind of material, and shaped to remove the metal in the easiest possible way. Very thin work influences the design because the cutting action may so tend to distort the work that a support of some sort is necessary, either for the tools or for the work itself. Material may be of such a nature that it is cut dry, or again it may require cutting lubricant in order to produce good results. These points must all be taken into consideration in the design.

(2) Method of holding: The method by which work is held affects the design of tools in two ways. First, by the possibility of interferences which might be caused by a lug or clamp on some portion of the fixture; and second, by the direction of the cut. In machining irregular castings care must be taken in the design of tools, so that they cannot strike or interfere with portions of the fixture.

(3) Amount of stock to be removed: This is an important factor, not only with respect to the shape of the toolholder itself, but also on account of the necessity for sufficient rigidity to withstand the pressure of the cut. This factor affects the cutting tool itself, as there must be sufficient "section" to carry away the heat rapidly.

(4) Length and width of cut: When short work is to be machined, the cutting tools do not require a great deal of care in their design, other than to make sure that they are properly shaped and held. When the work is long, however, tools must be designed so that they have considerable overhang from the turret. This matter is likely to cause trouble either in the indexing of the turret or in vibration during the cut, unless some method of support is provided.

(5) Accuracy required: In turret-lathe work it is possible with careful tooling to produce work within very close limits of accuracy. Suitable provision must be made to compensate for slight inaccuracies in the indexing of the turret. Unless this is done, work may vary somewhat over or under the size desired.

Turret-lathe work usually consists of a number of different operations on the same piece of work. The operations are performed in sequence; and, for example, work may be turned, faced, drilled, bored, reamed, tapped, recessed or threaded. All of these operations require different tools, some of which are standard, some special, some applied to the turret and others to the cross-slide. We shall treat them separately as to design, but later shall consider them as they are affected by others which may be used with them. The operations of turning, drilling and boring are often performed together, and occasionally a grooving or facing operation takes place at the same time as one or more of the former operations. This depends upon the nature of the work and the method of handling.

Design of Turning Tools

In the removal of stock from the outside of a piece of work by the process of turning, the presentation of the tool to the work is of great importance. It is not our purpose to go into the theory of cutting tools to a great extent, but a few fundamental points which are important in connection with the design will be discussed briefly. The purpose of a cutting tool of any kind is to remove stock as easily and rapidly as possible, at the same time leaving the work in good condition.

For the authors' forthcoming book. All rights reserved.

Modern machine tools are usually proportioned so that they have power enough to pull practically any kind of a tool combination through the work. Some of the heavier machines have excess power sufficient to break the largest tool that can be put in the holder without "stalling" the machine, or even causing it to hesitate. Maximum tool efficiency can only be attained by having a great number of tools working simultaneously, thus removing as much stock as possible in a minimum amount of time. Consideration must be given to the work itself, the method of holding, the accuracy required, and the cutting lubricant. Feeds and speeds must also be properly proportioned in accordance with the nature of the work.

Cutting tools for turret and engine lathe work really consist of two parts, the holder and the tool. The combination of holder and cutting tool are often referred to as a "tool," although this is not strictly accurate.

Two fundamental points in design are as follows: 1. The holder must be so proportioned that it will be rigid in relation to the work. It must be firmly

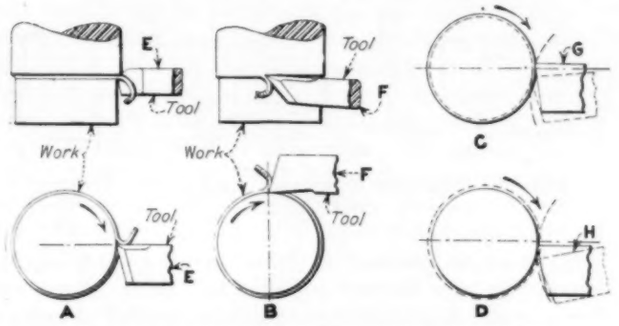


FIG. 288. APPLICATION OF TOOL TO WORK

secured to the turret or cross-slide, and must support and hold the tool firmly.

2. The tool must be large enough to carry away the heat generated by the cutting action, and so proportioned as to withstand the stresses to which it is subjected. Small tool sections are not economical in any way, except for light finishing cuts.

Tools for turning bar stock are arranged in two different ways, viz., radial or tangent to the work. The radial position is commonly used for box tools and multiple set-ups of various kinds. Tangent tools are used most frequently in universal turning tools or other similar devices. In the application of a cutting tool to the work, the aim is to remove the stock by a tool of such shape that the metal will be "sheared" rather than "torn" off.

Several examples which illustrate the application of a cutting tool to a piece of bar work are shown in Fig. 288. The illustration at *A* shows the position of the radial tool *E* with respect to the work. The form which the chip takes is clearly shown. At *B* the tool *F* is a tangent tool. Its shape is somewhat different from that shown at *E* and it removes the metal in a little different way, there being more of a wedging or splitting action in the tangent tool.

The position, with respect to the center of the work, of radial tools for turning is important. If placed above the center, as shown at *C*, the tool *G* under the stress of a heavy cut may be deflected and take the position shown by the dotted lines. This tends to produce chatter, as the tool "digs into" the work when deflected. If the tool is set as shown in the example *D*, slightly below the center, a heavy cut may cause it to deflect as shown by the dotted lines at *H*. However, its position is such with respect to the center and the outside of the work that this deflection tends to throw it away from the work and not into it, as in the preceding case. Both of these examples apply entirely to outside turning, and they are somewhat exaggerated in order to illustrate the points clearly. It is an advantage at times to position the tool slightly below center on a heavy cut, in order to avoid the chatter that might otherwise be caused.

Back Rests for Bar Work

If the work being turned tends to spring away from the tool, the result will be inaccurate work and a certain amount of chatter. In order to provide against such a condition, box tools are so designed that the work is supported by means of back rests so arranged that the work lies in a sort of a V. Several examples which illustrate the use of back rests are shown in Fig. 289. In the example *A*, the work is being cut by means of the tool *B*, and opposite to it are two rollers *C* and *D*, adjustably mounted so that they give support to the work during the cutting action. This example shows the use of back rests in connection with a radial cutting tool. Another example shows a tangent tool at *E* and two roller back rests at *F* and *G*. The latter are in a somewhat different position with respect to the tool than those shown in the previous example.

In cutting bar stock with box tools having roller back rests, the rests may be adjusted differently according to the work. If the cutting is being done on a rough bar of stock like that shown at *X*, tool *H* would be set slightly in advance of the rollers *K*, so that the latter would bear against the finished surface. It is possible when machining cold-rolled steel, like that shown at *Y*, to adjust the rollers slightly ahead of the tool *L*, as

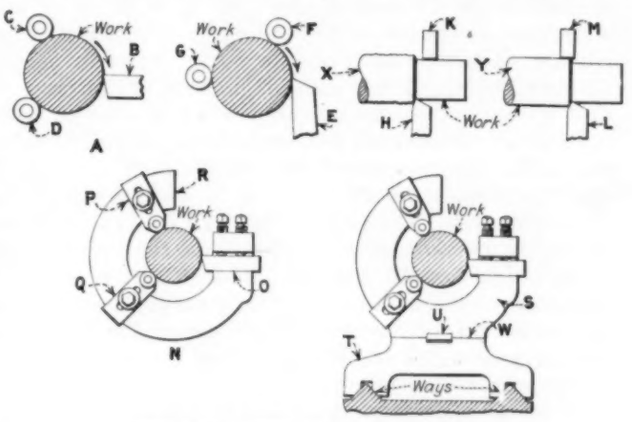


FIG. 289. USE OF BACK RESTS

indicated at *M*. The fact that the stock which is being cut is smooth allows this arrangement to be made.

In order to give a little better idea of the general features of importance in a box tool, another example, which illustrates several points in connection with the design, is shown at *N*. This type of tool uses two adjustable slides at *P* and *Q*, each of which is so arranged that it can be reversed to bring the rollers ahead of the tool, or *vice versa*. The tool itself is clamped in place at *O*, and a large body of metal is under it, so that it has sufficient support. It is necessary to provide a wide opening at *R* in order to allow the chips to pass out freely, so that they will not clog up or pack in

around the tool itself and interfere with its proper working.

On work requiring very heavy cutting, it is sometimes necessary to support the box tool. Provision for a condition of this kind can be made by the use of a casting, such as that shown at *T*, which is applied to the ways of the machine and clamped in position. The box tool *S* is furnished with a tongue at *U*, to act as a guide in the member *T* and assist in taking the pressure of the cut. The surfaces at *W* are carefully finished, so that the tool *S* slides freely over the lower member. Very often when a support of this kind is to be made, hardened blocks are provided on the bottom of the tool and on the top of the member *T*. This is simply a detail of the construction regarding which the tool designer will decide according to the nature of the work.

There is nothing much simpler in design than a turning tool used in a turret lathe for a small diameter. At the same time there are some points of interest which should not be neglected by the tool engineer when attempting to design tools of this nature. There is great difference between a tool which will work, and another which will work at maximum efficiency. Almost any kind of a holder with setscrews which can be used to hold a tool will turn a piece of work approximately to a given diameter, if it is set properly. Approximate sizes, however, are not good enough for the majority of work, and the results obtained from properly designed tooling are much more satisfactory than those produced by tools which are poorly designed.

There are a number of well-designed, standard, single-point turning tools on the market that can be purchased cheaply and used for work within their capacity. Certain pieces of work require special tools, either on account of their length or diameter, and the tools must then be designed to suit the conditions. It may be mentioned here that it is always advisable to design a special tool in such a way that it is more or less adjustable, so that it can be used if certain small changes should be made in the work. In other words, the tool should have a certain amount of latitude, so that it can be adapted to other work in case of need.

In Fig. 290 are shown several types of simple turning tools for comparatively small work and short lengths. The work shown at *A* is a plain cylindrical piece that is to be turned by the tool *B*. The machine on which the work is to be done is of the round-turret type, which permits holding the tool by the shank *C* only. A binder of some sort is generally used on the turret to make it secure. The body of the tool is of cast iron enlarged slightly at *D* and made rectangular in shape there in order to hold the tool. The tool *E* is of rectangular section, so that it fits an angular slot in the end of the holder. It is held in place by two setscrews, as indicated at *F*. The section which holds the tool should be made heavy enough to give plenty of stock for the setscrews, so that the tool can be clamped rigidly. If the operation to be done is a finishing cut, or if the amount of stock to be removed is not great, a tool of this type will give satisfactory results. The body of the tool should be made substantially so that it will not spring and cause chatter on the work.

A similar type of tool is shown at *G*, the work being the same as in the preceding case. A different type of turret is used here, and the hole *H* simply assists in locating the tool on the face of the turret. Bolts are used to secure it through the flange *K*. This design would be improved by reinforcing with one or more ribs, as shown by the dotted line at *L*. In general the type shown here will permit of slightly heavier cuts than the style at *B*, because of the added support that the turret gives and the somewhat stronger construction throughout.

It is very convenient to make a turning tool so that it can be adjusted both for length and diameter. This can be done as shown at *M*, in which the tool *N* is held in a bar which is adjustable lengthwise in the holder *O*. The holder is clamped in place in the turret by means of the shank *P*. The bar *Q* is flattened on its

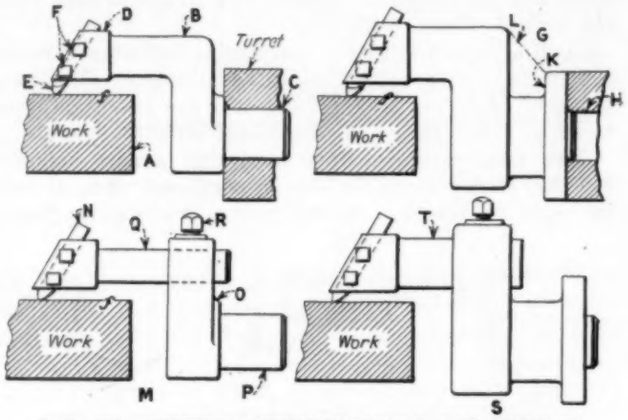


FIG. 290. SIMPLE TURNING TOOLS FOR TURRET LATHES

upper side to prevent it from turning, and can be clamped in any desired position by means of the setscrew at *R*. A similar type of holder applied to another kind of a machine is shown at *S*. The general features of this holder are like those previously described, the bar *T* being adjustable, so that it can be moved longitudinally as may be required.

None of the tools shown in this illustration are suited for heavy cutting, as they are not intended for this class of work. They will give excellent results on work which does not require the removal of a great amount of stock, but care must be taken in the design to make all parts heavy enough to stand the pressure of the cut.

A few points have been mentioned in connection with the design of holders for turning tools, but very little has been said about the cutting tools themselves, as far as methods of holding and adjusting are concerned. Very frequently several tools are required to produce different diameters at the same setting. They can be located in the same holder; but it is necessary to make the holder proportionately stronger, as the pressure of the cut is greater. Thus, a holder for a single tool can be much lighter in construction that one used for three or four tools cutting together.

The work *A* shown in Fig. 291 is to be finished on two diameters, as indicated by the finish marks. The tool holder *B* is of similar type to those previously described, but it has two tools in it, shown at *C* and *D*. These tools are spaced the correct distance apart, as determined by the shoulders on the work. They are held by means of setscrews in a slot in the end of the holder. In general, this tool conforms to standard practice, but the end *E* should not project beyond the end of the tool, as this limits the adaptability of the tools so that it can not be used to turn work close to a large shoulder because of the interference at the point

E. This trouble can be easily avoided, however, by cutting off the end of the block, as shown by the dotted line.

In setting two tools which are to be used to turn shoulder distances and diameters, it is not advisable to set both of them at an angle unless they are so arranged in the slot that they can be moved about. It is quite difficult to grind and set tools of this kind to produce accurate diameters and shoulder distances at the same time.

Another method of making up a tool block for the same piece of work is shown at *F*. The toolholder *G* is a casting similar to the one just described, but the block which holds the tool is adjustable vertically, so that several diameters can be handled. Other blocks with different tool spacings can be used in the same holder. An objection to this design is that the end *H* extends beyond the first one of the cutting tools. For special work this might not cause any trouble, but it would limit the field of action of the tool if it were wanted for another piece of similar work. In making up a holder with an adjustable block, the latter must be made very heavy, as the pull of the cut comes against the block. The two screws shown at *K* and *L* will not be sufficient to hold it. It would be an improvement to use four screws instead of two. A still more rigid construction could be obtained by placing the block on the other side of the holder *G*, thus letting the pull of the cut come directly against the body of the casting.

The diagram at *M* shows another method of arranging two tools for cutting diameters and shoulders

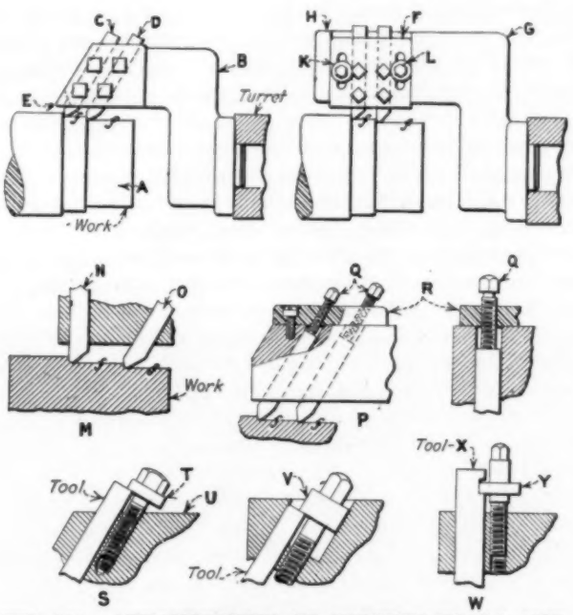


FIG. 291. ARRANGEMENT OF TURNING TOOLS AND BACKING-UP SCREWS

on the same piece of work, one of these tools *N* being set straight, while the other *O* is at an angle. It would be better to arrange the tools in the opposite way, and use the angular tool at *N* and a straight tool at *O*. This method would allow the tool to work close to a shoulder, if necessary.

Wherever possible, it is good practice to use a backing-up screw behind the tool, as shown in the example at *P*. The two screws at *Q* are supported by a plate *R* fastened to the top of the holder. The tools can be adjusted for diameter by means of the backing-up screws, which greatly assist also in preserving diameters on the work, as they form fixed stops against which the ends of the tools rest.

Another method of adjusting a tool is shown at *S*. This method is limited in its action, as the collar on the screw at *T* will interfere with the casting at *U* after the tool has been ground several times. It is better to arrange the screw as shown at *V*, by counterboring the casting so as to permit a greater amount of movement. Another method for the same purpose is shown at *W*. The tool *X* must be made specially when this kind of an adjustment is used, as the collar *Y* fits a groove in the tool itself. For certain kinds of work this arrangement may be found advantageous, because it permits adjustment both in and out.

The Payment of Unemployment Relief

BY JOHN S. WATTS

In this article, I propose to consider the necessity and advisability, or otherwise, of the payment of unearned wages to the unemployed during periods of unavoidable idleness.

The first point to consider is the effects of the present system, or lack of one, of leaving the burden of supporting the unemployed to be borne by the unemployed themselves, with only what assistance from the community as is absolutely necessary to support life. In the better-paid trades, it is expected that the workers will save sufficient from their wages in good times to tide them over the dull periods. This is, in essence, nothing else but the payment of unemployment relief to that class of workers which is strongly enough organized to compel it, in the form of increased wages, part of which wages are intended to form a relief fund administered by each worker individually. The weakness of this system is that the unemployment fund is paid, in the final analysis, by the public to the workers, and may or may not be used by them for its intended purpose, depending entirely upon the thrift and foresight of each worker.

If, through the extravagance or misfortune of the worker, the surplus is not saved, but is spent while work is plentiful, the worker and his family must be supported by the community at additional expense or left to starve, when the worker is idle. The payment of sufficient wages to enable the worker to set aside funds for his support during periods of temporary idleness, is defective in that the worker practically always looks upon the wage received as the income he should have continuously, and even if he does save a sufficient part of it, he feels it unfair that he should have to lose his savings through inability to get work.

In the majority of cases, those who are thrifty do not get out of work, but those who do not save are the very ones to be thrown out of employment first. Thus, the extra wages paid for unemployment relief are either misused to furnish a higher standard of living to the thrifty, or are wasted in extravagant living by the unthrifty, and in either case are, in large part, diverted from their intended use.

The lower-paid classes of labor can hardly be expected to be able to finance themselves in bad times, and when unemployment comes to them a week of idleness usually sees them destitute and a charge upon the resources of the community.

Then again, this system is weak in that it pays the

same amount to the single man as to the married man with a family to support, which is either too much for the one or too little for the other. As already suggested, there is no control over the money to see that it is reserved for its intended purpose, and in effect it creates a false standard of living among the unthrifty in times of plentiful work, and fails in fulfilling its purpose in bad times. Moreover, it is actually paid only to those who are already sufficiently well paid to be able to afford the expense necessary to organize themselves into a body strong enough to enforce their demands for sufficient wages to carry them through the lean periods.

Payment of Relief Now

From a consideration of the above facts, we may conclude that we actually do pay unemployment relief, although in a most inefficient and uneconomical manner, and presumably because it has been necessary to do so. Indeed, unless we are willing to allow a part of the people to die from starvation or other privation during the ever-recurring slumps in trade, there is no room for argument on the necessity for such relief being paid in some form or other. Even if we were able to contemplate allowing such a state of affairs, the payment of unemployment relief would still be at least advisable, if not necessary, because history proves that the mildest and meekest of people will become rebelious if deprived of the necessities of life, and the ultimate cost of subduing the tumult would be greater than would be necessary to alleviate its causes.

The fact that, when a famine strikes the whole community, all will submit to deprivation with more or less equanimity is beside the question, as in the circumstances we are considering, only that part of the population which is out of work is in want, and there is not necessarily any particular scarcity of goods. In fact, there is frequently a surplus, and under such circumstances, whenever the deprivation reaches a certain point, the sufferers, no matter how docile they be ordinarily, will attempt to take by force what they need, and generally destroy much more than what would have satisfied their demands.

It follows, therefore, that even from a purely commercial standpoint, it is both necessary and advisable that unemployment relief be paid, and that we do actually pay it now, except in those extremely rare cases where the one out of work actually dies from privation.

Under the present system, whenever unemployment is more widespread or lasts longer than usual, a considerable portion of the idle workers become subjects for charity, and suffer both moral and physical trials, which undermine their physique and their morality to a point where their efficiency as workers becomes seriously impaired. They are then easily led by agitators to follow Bolshevistic theories, which turn them from producers into dangerous nuisances. Some others, finding it possible to live on charity, will adopt this easy life and cease entirely to produce.

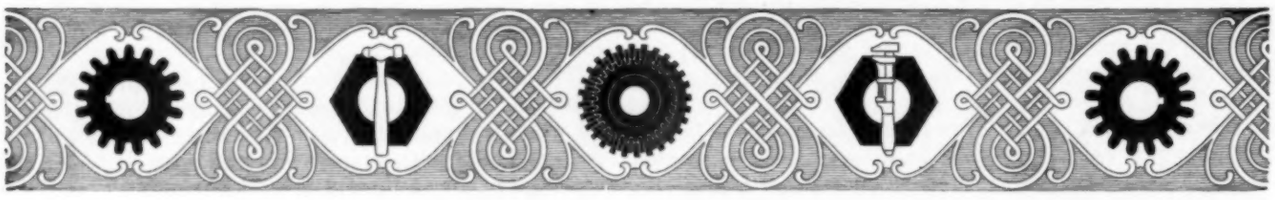
It may be contended, with some truth, that this applies only to a small percentage of the workers, and that most of them are well able to tide over a temporary period of idleness. But, the point I wish to make in this connection is that the man who by thrift has saved up enough to carry him through, has not consciously set aside a percentage of his pay as having been paid him for that purpose. He will, when he returns to work, use every effort at his disposal to reimburse himself for the savings he has spent, and which he regards as money earned during his working period and lost through no fault of his own. Whether he is successful in this depends not upon the ethics of the question, but upon his ability and the strength of the organization to which he belongs; and successful or not, there remains with him a feeling of discontent at his loss, which he will lay to the blame of his employers.

Separate Relief Needed

The remedy for this state of affairs would seem to be the payment of unemployment relief, separate entirely from the payment for work done, basing the amount of such relief on the man's responsibility in such matters as the family to be supported. In this way, the thrifty would be freed from the discouragement of seeing their savings dissipated by causes over which they have no control, and the extravagant would be prevented from spending that part of their wages which should be set aside for bad times. By paying this relief as a right due to every one, the stigma of receiving charity would be removed, and the possibility of adding to the professional mendicant class be eliminated.

The relief would be more fairly distributed than now, as those poorly organized workers would get precisely the same as those who were strongly organized. The cost would be much less than is actually being paid out now, especially when we remember that the stronger trades are steadily paid a total wage including the amount necessary to cover unemployment, whether unemployment ensues or not. Further, when we as a people commence paying unemployment wages, it is to be expected that we will be more keen on preventing unemployment than we are at present, because then the cost will come directly home to us, instead of being absorbed into the general cost, and paid by us all indirectly.

The indirect losses of the present lack of system in unemployment relief, such as the losses incurred by the storekeepers giving credit during periods of unemployment, the losses at the banks through the failures of retailers giving this credit, and other losses which the reader can easily add for himself, are in themselves enough to warrant the systematic payment of this relief.



Making Oil Well Tools

Reamer Cutters Forged from Nickel Steel Billets — A Universal Fixture for the Planer — Drilling, Slotting, Milling and Turning Operations

By FRANK A. STANLEY

THE illustrations show features of the practice of the Wilson & Willard Manufacturing Co., Los Angeles, Cal., in the production of under reamers for oil well work. These under reamers are made in

FIG 1. VERTICAL MILLING OPERATION

various sizes from 3 to 20 in. in diameter and range in weight from say 200 lb. in the small size to something like a ton in the case of the 20-in. tool. The reamer parts are of steel forgings and some interesting methods are applied in machining the body and cutters.

An idea of the character of the forgings used in the reamers will be gathered from Fig. 1 which also illustrates a vertical milling operation that will be referred to later. The construction of the reamer will be seen in Fig. 2 which shows an assembly drawing of the 10-in. size. Here the body is represented in longitudinal section at *A*, the cutters at *B*, the T-bar to

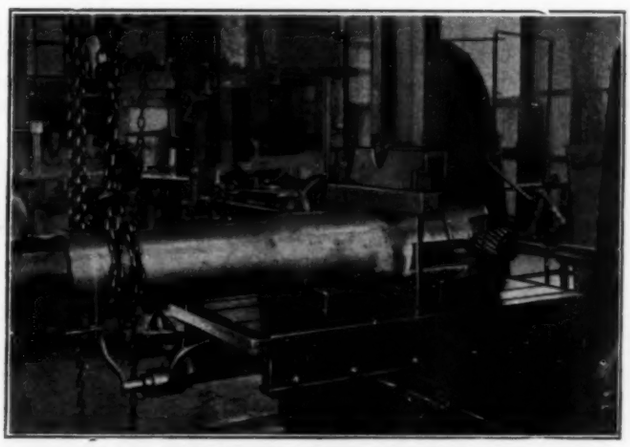


FIG. 3. MILLING END OF REAMER BODY FOR THE CUTTERS

which they are attached at *C*. The shank of the T-bar passes up through a heavy coiled spring *D* enclosed in the hollow body *A*.

The nickel-steel forging for this one-piece body is turned on the outside and then mounted in a lathe for drilling out the interior. The drilling is accomplished with long flat drills operated under a liberal supply of cooling liquid which is forced to the point of the drill under pressure and washes out all chips. The feed for the drills is applied through a special ratchet and lever which force the feed spindle forward and advance the tool into the cut.

The drilled body then is placed in a slotting machine where the metal is cut out through opposite walls to form openings for the cutter shanks and where the metal at the extreme end of the body is cut away at the sides to leave the projecting ears *E*, Fig. 2. The enlarged chamber *F*, at the end of the body, is bored out in the lathe to the required taper for the cutters and the inner and outer corners formed to the desired radius as represented in the drawing.

For finishing the side slots to width to receive the cutters, the reamer body is mounted on the machine shown in Fig. 3 and milled out in the manner indicated. The body rests on a pair of V-blocks in which it is secured by a heavy strap with long bolts at each end. The outer end of the forging is carried by a chain sling suspended from the hook of a hoist.

Forging the cutters under a 3,500-lb. steam hammer

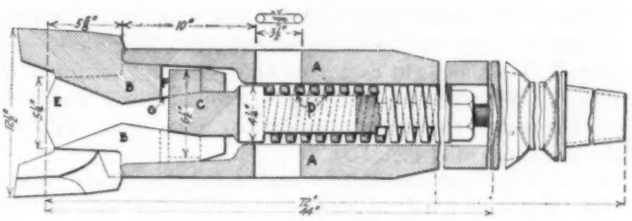


FIG. 2. AN UNDER REAMER FOR OIL WELLS

is illustrated by Fig. 4. The billet is suspended in an endless chain on a crane and manipulated by the long tongs in which it is handled between heating furnace and anvil. The cross lever on the tongs enables the workmen to roll the work over from face to face for operation under the hammer.

The forgings are heated for several hours in a gas furnace and allowed to cool over night. This relieves the surface hardness and allows the parts to be machined without difficulty.

Some of the operations through which the cutters pass in the process of finishing are illustrated herewith.

For all sizes of reamer cutters there are special planing fixtures, two of which are represented by Figs. 5 and 6. These fixtures are so designed as to be universal for any sizes of cutters within their capacity; that is, once the forged cutter is gripped in the fixture, it is carried through different planing operations without being removed from its holder and in taking successive cuts on the exposed face of the work the fixture is adjusted to the necessary positions without being released from the planer table.

Referring to Fig. 5, the fixture is shown as set up for the crosswise planing of the cutter shank. The

work is gripped in a holding block mounted upon a trunnion, *T*, Fig. 7, upon which the holder may be adjusted to different positions for the various angles of surfaces to be machined. These angular surfaces are taken care of by positive locations through an index pin and suitably located holes; and in any position of holder, the parts are gripped fast by clamp bolts at the side of the base casting. The work itself is gripped by setscrews in the holding casting.

The main casting in which the trunnion fixture is

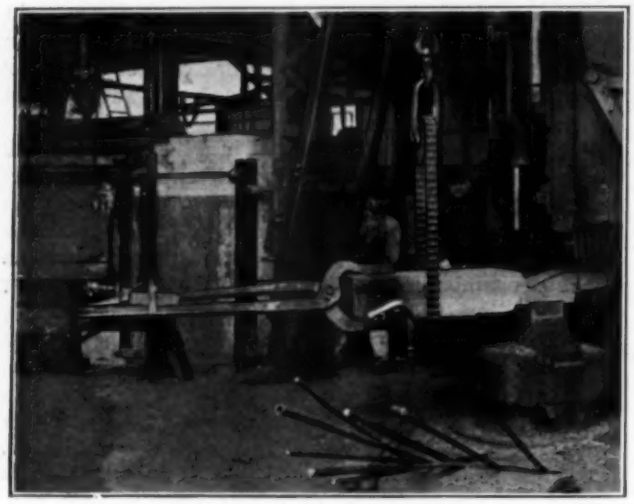
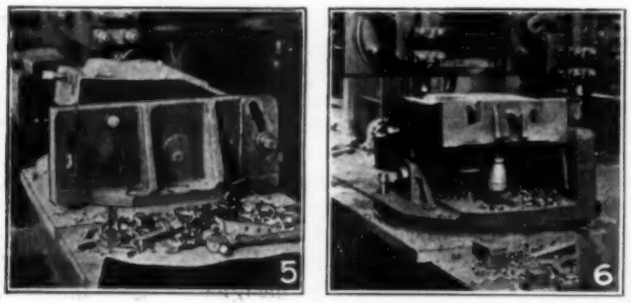


FIG. 4. FORGING THE CUTTERS

mounted is itself mounted upon a swivel plate upon which it can be indexed around in a horizontal plane to bring the work into longitudinal position as represented in Fig. 6. In this view the forging to be planed is at a right-angle to the position occupied in Fig. 5. This photograph also shows the jack which is placed under the holder to support the work against the pressure of the cut.

The forgings are heavy and owing to their shape they are very awkward pieces to hold for any of the planing cuts unless mounted in some such device as shown. Then owing to the several angles to which the surfaces are finished, a great amount of time would be consumed in the mere setting of individual forgings for successive cuts, to say nothing of the difficulty



FIGS. 5 AND 6. PLANING THE CUTTERS

which would be experienced in getting these angles established properly for a large number of cutters.

Machining the sides of the cutters for fitting into the seats milled in the body, is accomplished in other fixtures of suitable design.

Turning the outside diameters of the cutters is attended to with the two cutters set into position in

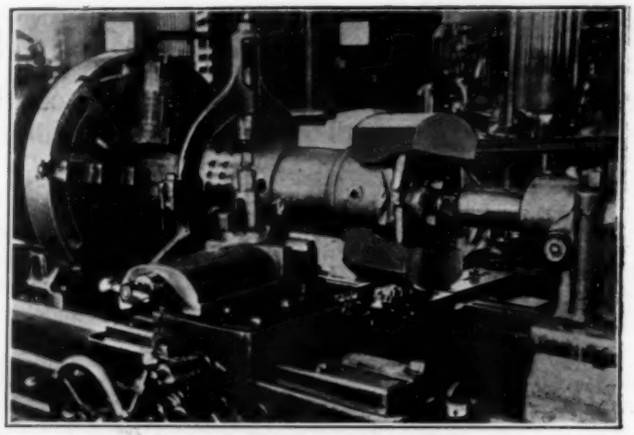


FIG. 8. A TURNING OPERATION

a holding body as shown in Fig. 8, where the operation of finishing the rear ends of the cutters is represented. The turning of the various diameters involves also the finishing of the tapered portions, that is the large diameter at the front end, the bevelling of the outer ends and shoulders and the turning of the tapered rear ends of the cutters where they fit into the corresponding tapered mouth or chamber in the body of the reamer.

This means that there are at least four different

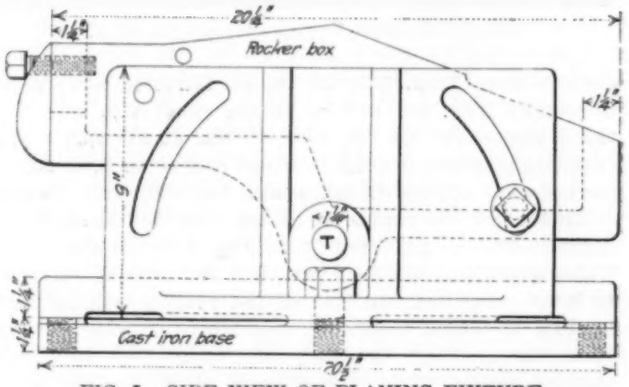


FIG. 7. SIDE VIEW OF PLANING FIXTURE

tapers to be turned on each pair of cutters, and suitable attachments and devices are applied to set the cutters properly for each cut. In the operation illustrated in Fig. 8 a pair of toggle-shaped jaws are set out

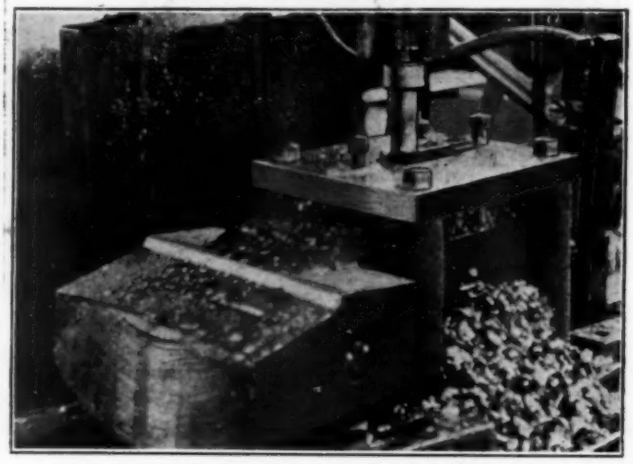


FIG. 9. CUTTER DRILLING JIG

between the inner faces of the cutters to force them outwardly to correct position so that when a straight cut is taken across the outside the sizes will be correct. Other fixtures hold the cutters for the proper finishing of the other outside surfaces.

There is in each cutter a slot (shown at *G*, Fig. 2) to admit the ears on the T-bar, and these slots are formed by first drilling out the stock as far as possible by means of a jig and then finishing the job by end milling.

The drill jig used is of the type shown in Fig. 9 and is in the form of an open device into which the machined cutter blank is placed, after which two set-screws are tightened to secure the work against possibility of shifting during drilling. The jig plate is provided with series of bushings in a row spaced as closely as feasible. After drilling, the thin web left is removed and the slot sized by means of the operation already referred to in connection with Fig. 1.

For end milling, the machined cutter is secured in the vise on the table of the machine and supported under the overhanging end by means of a short jack which serves to keep the work in level position. The end milling is then accomplished, completing the slot.

In the case of the cutters shown in Fig. 2, the slots thus cut are $\frac{5}{8}$ in. wide by $3\frac{1}{2}$ in. long.

Squeezing Out the Surplus

BY JOHN R. GODFREY

The more I get to know old man Johnson the more I wish he were twenty years younger: He's got such a bunch of the good horse sense that we need so badly just about now. And it takes so long to get under the skin of the hard-shelled oldtimers who pride themselves on the good old days and want to go back to pre-war days in everything. But not Johnson—he knows better.

They had a meeting of motor builders the other day and he rang me in again as his alleged secretary. He says it adds to the dignity of the occasion and nobody knows whether I'm a real "sec" or not. It wasn't to set or hold prices, of course—such meetings never are—but they got down to hardpan after the first half hour and there was sure some fireworks before we adjourned *sine die*, or something which means that some of them will be among the late departed before they meet again.

The old-timers don't exactly love Johnson, but the younger men sort of egg him on. He says about what they believe and it carries weight because he's been in the game a long time. He kept pretty quiet till old man Stanhow proposed a big combination of motor builders, each man putting in his plant, at a good price of course. and letting the public in as a special favor, to hold the bag. Then Johnson got into action.

"Can't be done, Stanhow, even if we wanted to. The public has its eyes open and I wish they were open wider. You want to unload a plant that was built at high prices and equipped with any old junk you could buy at a profit at war-time prices. You'll be lucky if you get 10 per cent and you won't get that if you hug the delusion of a profit. You are one of those who patriotically broke into the motor field as a war measure—made a big profit—and now want to stay in a game that's overcrowded. You better drop motors and go back to sawmills. The going won't be any better for war babies than it is right now.

"Let's look the facts in the face and not kid ourselves. There's over twice the motor capacity in this country there was in 1914. We all have enough stock to supply a normal demand for months. Besides that there are thousands of used motors on the market or ready to sell as soon as anyone hears any sound like an order. This can only mean one thing—some of us have got to get out or be forced out.

"Probably all of us think the other fellow ought to get out and leave him the field. Perhaps we might draw lots—but that would only be a temporary settlement. Chance would leave in the wrong ones. There's got to be a weeding out of at least 50 per cent of our building capacity—and that means a lot more than 50 per cent of the shops.

"As long as you've asked me to talk I'll suggest a way. All of us must lay the cards on the table, face up. Show our plant cost, capacity and condition. We must show our costs for material, labor, factory overhead, office overhead and selling costs, not forgetting our available surplus, cash and credit. And lastly our profit, both total and in percentage.

"This ought to show pretty clearly who has a right to stay in the game. It's just possible that those who stay can utilize some part of the equipment or patents of those who are eliminated. But it must be at a bargain price. The business won't stand anything more."

Of course Johnson isn't popular with the daddies of the war-baby shops. Stanhow threw a fit about co-operation and restriction of output so that all could live.

"Fine suggestion, Stanhow, especially as you are the fellow who told us how un-American it was for labor to restrict output so as to make jobs for more men. You proved that the more work they did the more there'd be to do. But you don't think it'll work with motors evidently. And your kind of co-operation is lop-sided. The only co-operation that can live is the kind that helps everybody, clear down to the consumer.

"Whether we get together in a new corporation, or some voluntarily withdraw on the basis of the statements I suggested, I feel the time has come to reconsider prices very carefully. Little cuts of 5 and 10 per cent only delay the game. The buyer waits for what he calls a *real* cut in price. When we cut, let's make it a real one—show why we made it, why it can't go lower—and see if we can't get the buyer to have some confidence, just for a change.

"Our shop has gone into costs pretty carefully. We've figured these costs on present-day values, not on fifty-dollar pig iron. We got stuck with some of that and must take our loss. Our castings will be cheaper, likewise some other materials. Labor will not go down much. If it does we lose a big market for all sorts of manufactured goods from vacuum cleaners to dishwashers and the like. Selling costs ought to go down if we put prices down to rock-bottom at one fell swoop. That's what we are going to do in any case. We're going to put prices where we believe they belong. And incidentally, I happened to know that this is below the shop cost of some of the other motors.

"With these shops eliminated the selling costs will go down, more motors will be sold and we'll be started back toward a normal business. I hate to seem ruthless, but I don't play with any cards up my sleeve. If I had high production costs and small volume—I'd try and get out while I still had a shirt and an overcoat left."

I'm wondering whether the old man isn't more of a prophet himself than some of them like to think.

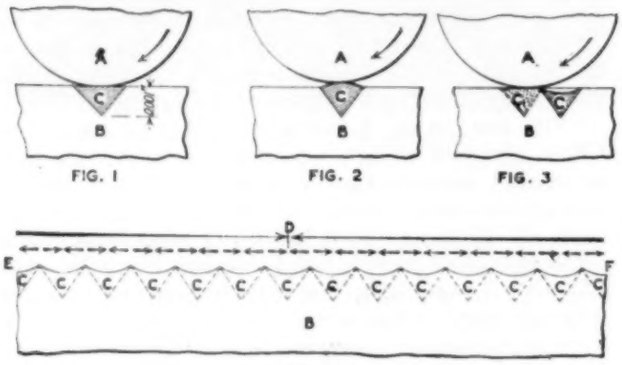
Why Work Curls Towards the Wheel While Being Surface Ground

Plausible Theory Deduced from Long Experience — Work Heated Beyond Critical Point in Numberless Places Takes Permanent Set When Quenched by Coolant

BY E. A. DIXIE

ONE of the commonest phenomena of surface grinding is the curling of the work towards the wheel. Having had much to do with surface grinding during the past few years this objectionable feature, especially with thin work, has given a great deal of trouble. It has been said that if the cause of an effect is found it is a simple matter to effect a cure. With this in mind I have attempted to run down the cause of curling in the hope that a remedy would be evolved which would assure the production of perfectly flat thin work. I believe I have found the cause, but so far no cure.

The cause of curling towards the wheel is the shrinkage of the side of the work which is next to the wheel.



FIGS. 1 TO 4. DIAGRAMS SHOWING THE CAUSE OF CURLING TOWARDS THE WHEEL

I don't ask anyone to believe this till sufficient evidence is offered in proof. But I do ask—is it not reasonable to suppose that the work would curl towards the wheel if it were possible to shrink and shorten the side being ground, while the length of the other side remained unchanged? If one takes a piece of steel 1/32 in. thick and 1 in. wide by, say, 6 in. long, heats it, then holds it horizontally and spills a few drops of water on the top surface, the two ends will curl upwards. If the piece of steel is again heated and wet on the convex side the ends will curl and it will become concave, but the effect is not so pronounced because of the previous shortening of the other side. A blast of cold air will produce results similar to those produced by the water.

The reason I have suggested the employment of such thin stock for this experiment is because the effect is more noticeable, but the same effect is present when thick stock or even square or cylindrical bars are used. Have you ever seen an expert straightening hardened steel reamers? He heats them till solder will melt on them, places supports under the two ends, applies pressure to the convex side and then wets the same side with water. If the reamer is long, one can see the ends curl towards the side to which the water is applied. The water chills and contracts that side while the other side is still warm.

The force which causes the contraction is enormous, as is well known to all engineers, and is sufficient to put a permanent set in the opposite side of the piece, in other words it is greater than the yield point of the steel.

With conditions as outlined above, the piece curls toward the side which while heated is suddenly cooled. Similar conditions exist during the surface-grinding operation. The work *after* passing the wheel is *apparently quite cool*, but is *very hot exactly at the point where the wheel is taking its cut.*

The critical points of all hardening steels are somewhere over 1,300 deg. F. This means that in order to harden a piece of such steel one must heat it to or a *little over* the critical point to cause it to harden when quenched. If it be quickly quenched at this temperature it will *harden*, but if it be heated *to below* the critical point and then quenched it will *not harden*, or if it be heated to the critical point and allowed to cool *slowly* to below the recalescent point it will *not harden*. I think all metallurgists agree in this.

If a piece of *annealed tool steel* is ground on the surface grinder and a *hard* wheel and *heavy* feed is used there are likely to be "burnt" spots on the surface. Such burnt spots are very noticeable when one uses a vertical surface-grinder either with or without cooling water. The burnt spots show discolorations similar to the so-called "temper colors," which vary from pale straw to deep purple or blue. These burnt spots are usually *depressed* below the surrounding surface and very often *they are file hard*. Not only are they depressed below the surrounding surface, but their centers are lower than their edges. That is to say, a burnt spot is concave, with its lowest point in the center. The fact that they are hard indicates they have been heated to or above the critical point, then rapidly cooled.

There is a great deal of friction between the dull or hard wheel and the work and the heat at the point of contact is so intense that the surface of the work is heated to or above the critical point. However the traverse of the grinding machine table is constant and the heated area passes quickly from under the wheel, is exposed to the flood of cooling water and is instantly chilled, becoming hard as evidenced by the hard spots previously referred to.

THINNESS OF HEATED AREAS

I do not mean to say that these heated areas are of any appreciable thickness; they cannot be, as the surrounding metal being cool absorbs the heat very rapidly. At most there is but a very thin film of metal which is heated to or above the critical point, and is therefore capable of being hardened when it is quenched by the cooling water. That this is really a thin film of metal of no appreciable thickness is proved by careful grinding. For if the surface be removed by successive cuts of slight depth and the surface of the burnt spot be tested with a file after each cut, it will often be found

that the hard surface is *not over a thousandth of an inch thick.*

As the surfaces of these burnt or hard areas are *below* the surface of the surrounding metal and as this feature is *almost invariably* present, there must be some reason; it cannot be just chance.

The reason why the surface of the burnt areas are below the surrounding surfaces is not far to seek. At the point where burning takes place the thin film of metal is heated by the friction of the wheel till it is above the critical point. It is in a quasi-plastic state. On top of it is the wheel and surrounding it elsewhere is the cold or comparatively cold metal of the body of the work. This small "lake" (if I may so term it) of plastic metal occupies more space than it did when cold. It cannot expand downwards because of the unyielding body of cold steel below; it cannot expand sidewise because of the cold steel which surrounds it, so the only direction in which it can expand is upwards against the wheel, and the minute quantity of metal which thus protrudes is cut off and removed by the rapidly revolving wheel. The next instant the wheel passes on beyond this portion of the surface and the cooling water chills the burnt "lake." The instant it is chilled it shrinks back to normal density and as there is now less steel in the lake than there was before its top was cut off by the wheel, its surface shrinks below the surrounding surface. Naturally the greatest shrinkage takes place at the center where the heated area was deepest.

Results Under Certain Conditions of Grinding

These examples of burnt surfaces are the *extremes* which are given as evidence that under certain conditions of grinding the surface of the steel is heated to at least the critical point of the steel. In ordinary flat grinding the surface does not become so highly heated. But there is no doubt that the surface is superheated (not necessarily to the critical point) in a series of very minute points or lines where the wheel has contact with the work. The heating by the wheel and cooling by the coolant, or by the air, of these minute points or lines is practically coincident, so rapidly does the cooling follow the heating.

In the illustrations I have shown the idea diagrammatically, similar reference letters being used throughout the sketches to designate similar elements.

In Fig. 1, *A* is the wheel, *B* the work and *C* the highly heated area immediately below and in contact with the wheel. I have arbitrarily stated its depth as 0.001 in. but this may, in either direction, be very far from its actual depth.

In Fig. 2 the wheel *A* is *raised* above the surface to show how the top of the heated area *C* would tend to rise toward the wheel. In practice the wheel would, of course, not be thus raised but would remain on a level with the surface being ground, and the curved top of the heated area *C* would be cut off level with the rest of the surface.

In Fig 3 is shown the shrinkage which takes place on the top surface of the heated area *C* after the wheel has passed and it has been cooled. In Fig. 3 the wheel has passed *C* and is now heating the area *C'* shown in dotted lines.

In Fig. 4 is shown a series of areas *C*, each with two arrows indicating the direction of shrinkage in each of them, and above are two long arrows showing the direction of the aggregate shrinkages of all the areas on each side of the center *D*, of the work. It must be borne in mind when considering the sketches that the areas *C* in properly surface-ground work are very short, possibly not more than two or three thousandths of an inch, and perhaps not even that. The sum of the shrinkages on each side of the center is toward the center, thus we have a greater or less force tending to pull the point *E* toward *F* and vice sersa. The result of this force is to curve the two ends *E* and *F* upwards, leaving the work hollow on the top, which is the wheel side.

I can hear some of the readers say: "If the wheel heats the top of the work that should make the bottom and not the top concave." This perhaps might be true if the applied force were as great; but it cannot be. Heating the top would momentarliy make the bottom concave, but hot metal is more easily compressible than cold, so that it is reasonable to assume that the bulk of the force created by heating the top would be rendered ineffective by the compression of the metal in the heated top. It is very doubtful whether the force of expansion of the top could be made so great as to exceed the elastic limit of the cold bottom and cause it to take a permanent set.

Reminiscences of an Old-School Machinist

By R. Thomas Huntington

Sixty years have brought about many changes. Not only has there been a wonderful increase in the capacity of machine tools that were then standard, but new ones have been introduced in infinite variety so that now many jobs that, in my boyhood days could be performed only by hand at the expense of many hours, or perhaps days, of patient and painstaking endeavor, are now regularly finished in a matter of minutes by precision machinery.

So, too, have the shops themselves changed. Though the Norris Locomotive Works wherein I served my apprenticeship was a large shop, it was not large in comparison with the large shops of today; nor were shops of even that size common. Machine shops were much more likely to be conducted by one man, or by two men in partnership; men who had "served their time" and had worked up from the ranks to a position where they were able to start a shop of their own.

Practical Men Shop Proprietors

Machine-shop proprietors were thus practical men; working at least part of the time at the bench with the "boys" and keeping in close touch at all times with their employees so that many of the evils that follow in the train of the later day large organizations were then unknown.

Such were the conditions when I first went to Boston in 1870. During my experience there, a part of which I have already set down here, I saw the beginnings of some of the organizations that are today numbered among the country's largest producers, and made the acquaintance of men whose names have become known all over the world as leaders in the machinery and machine-tool industry.

I remained in Boston nearly ten years; going from there to a near-by town in the employ of a man named Remington who had devised a method for making jewelry by a process which he called by the high-sounding title of "Kalvano-Plastic-Manipulations," but which in plain English was nothing more than electrotyping. He would take an impression in prepared wax of the object he sought to reproduce, put the wax mold in the

plating bath and leave it there all night, or perhaps for several days, according to the thickness of deposit that was desired.

Mr. Remington experienced considerable financial difficulty in the Boston markets and finally removed his small plant to Providence, R. I. I did practically all the work of taking down the machinery and re-erecting it in the shop which he had secured in the latter city. Shortly after getting started in Providence he again became involved in money troubles, and I was obliged to seek employment elsewhere.

The micrometer caliper was then a comparatively little known tool and it was in Providence that I saw one for the first time. I happened into the Loomis hardware store on Weybosset St. at a time when a salesman was trying to sell such a tool to a customer—a rather oldish man and evidently a mechanic—who was decidedly skeptical of the capability of the device for making the minute measurements claimed for it.

"You can never make me believe," he said, "that a man can work to such a close measurement as the one-thousandth part of an inch." Though never having seen the tool before, I was familiar with the principle upon which it was constructed, and, seeing the salesman at the end of his rope, I butted into the conversation. "My friend," I said, "did you never fit two parts together and have them slide freely but without shake?" "Many a time," he replied, "I have been doing it all my life." "Then," I told him, "you have been working well within the one-thousandth part of an inch with nothing better than your old callers." I thereupon explained to him the principle of the instrument; that there was quite a distance between the marks upon the thimble that represented thousandths; and that by using this graduation in conjunction with the fine-pitched screw it was quite possible to measure within the limits claimed.

I succeeded so well in convincing the man of the practicability of the micrometer that he bought the tool then and there.

I applied for and secured employment at the well-known shops of Brown & Sharpe, and was assigned to the "punch and die job" on the third floor of the sewing machine department, which was under the general foremanship of H. M. Leland.

I found that a good deal of the manufacturing in this shop was done upon what was practically a contract system. Different jobs, such as the "frame job," the "milling machine job," the "screw-machine job," etc., would be let out to capable mechanics who would employ others to help them when the job became too big for their individual capacity; and thus there were a number of sub-foremen under the general supervision of Mr. Leland, each of whom would have from one or two to a dozen men working for him.

Not long after I went there Mr. Leland decided to establish a new job, the drilling job, and of this work he placed me in charge. Before that, the different contractors had been accustomed to do their drilling whenever and wherever they could find an idle drill-press, and there had been much trouble and loss of parts from careless or indifferent workmanship in this respect.

My new department had four Pratt & Whitney four-spindle drill presses, two single-spindle sensitive drill presses, and a tapping machine. My work was to set up these machines for each new job that came along, see that the first pieces were drilled and tapped to conform to all the gages, and then to turn the work over to a machine hand; keeping tabs upon him from time to time to see that the work did not fall off in quality. As most of the jobs were paid by the piece, this was not always an easy task.

All drills, taps, etc., necessary to the job, were furnished to the man free of charge at the start, but if he broke any he was obliged to replace them at his own expense. The company made all these small tools themselves and supplied the men at cost.

Some time after I entered their employ Brown & Sharpe instituted the practice of sending their foremen out upon the road as salesmen; with the double object in view of getting acquainted with the users of Brown & Sharpe products, and seeing for themselves what others were doing along similar lines of manufacture. On one such trip through the Middle-West Mr. Leland, the foreman for whom I worked, was offered the superintendency of a shop just starting in business in Columbus, Ohio, to manufacture the Jordan furniture caster; an offer which he accepted, and he soon after severed his connection with Brown & Sharpe.

Not being entirely satisfied with conditions as I found them after Mr. Leland's departure, I wrote that gentleman in Columbus, offering my services which offer he accepted, and I soon joined him in the Ohio city, where I tried to the best of my ability to assist him in lowering the cost of production to a point where the firm could stay in business.

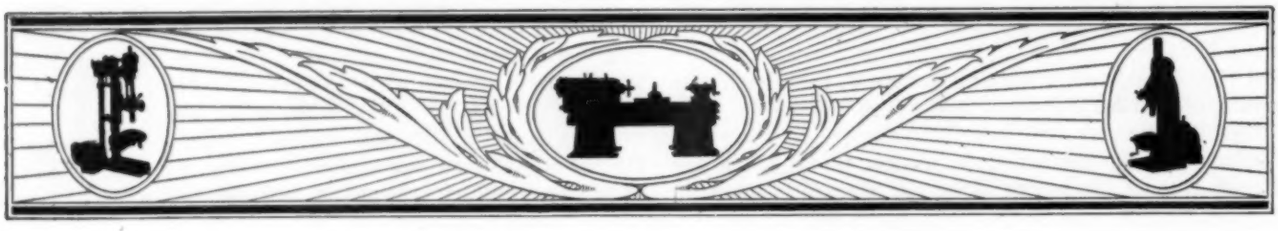
The Jordan caster was of excellent design but it was too complicated to compete in the open market with the ordinary form. It had two wheels, or rollers, instead of one, and the axes of the wheels were inclined away from each other so that the wheels were quite close together at the bottom and half an inch or so apart at the top. The number of parts and the difficulty of assembling them made it a losing proposition to manufacture.

A Use for Old Bearing Balls

BY DAVE HUGHES

Recently we had a number of clamping screw pins to make with a ball on each end. The pins were ¼ in. in diameter.

While turning down the ends of the pins, I put the required number of bearing balls in the furnace for annealing. The annealed balls were held in a universal chuck against a stop in the back, spot-faced to the diameter of the pin and drilled for a drive fit. They were then driven on and polished. The balls were reclaimed from the scrap box.



Grinding Differential Spider Arms

A Method Which Eliminates the Use of Centers and an Inspection Gage for Insuring Accuracy in Alignment

BY CHARLES KOTERSALL
Chief Tool Designer, Peerless Motor Car Co.

THE accompanying illustrations show an indexing fixture for grinding the four arms of the differential spider for an automobile rear axle.

Previously, this operation was done by grinding on centers, but this method did not prove to be very satisfactory on account of the arms not coming at right angles with each other and not parallel in the same plane. This deviation is caused by the heat-treating, and it is extremely difficult to get a part of this kind through the heat-treating department without distortion. The fixture herewith described eliminates the centering operation and the straightening operation after the heat-treating is done.

In the first place, it is very essential that the arms be ground at right-angles and parallel in the same plane. Fig. 1 shows the grinding fixture, Fig. 2 shows the work to be ground, and Fig. 3 shows the gage used for checking the squareness and parallelism of the differential spider. It is also to be noted that in this case the grinding of the arms is to be the last operation after machining and heat-treating is done.

In Fig. 1, the body *A* is mounted on the taper shank *B* which is fitted to a 10 x 24-in. Norton grinding machine having a live head. The body casting *A* is made with a cored pocket to receive lead to secure the proper balance. The stud *C* is screwed into the body *A* at *O*. The lower index plate *J* is pressed into the body at *A* and doweled with pins *M*. The upper index plate *H* is pressed and doweled with pins *N* to the index plug *G*. *F* is a U-washer. *E* is a clamp work nut. *D* is the index clamp nut. *K* is a compression spring to lift the index plug *G* off the index plate *J*. *L* is a soft packing to prevent the grit and water from working up into the index plates *H* and *J*. The shell *I* is to cover the indexing mechanism.

To grind the spiders, the clamp nut *D* is to be tightened against the index plug *G* to lock it. The U-washer *F* is removed and the spider passed over the clamp nuts

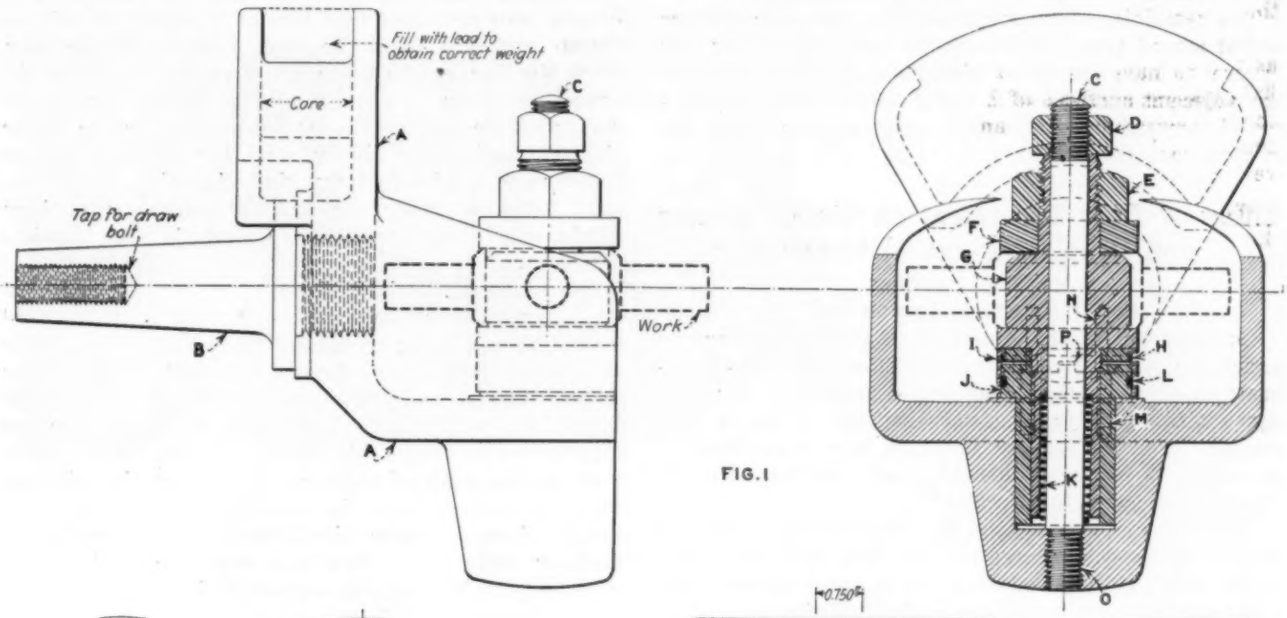


FIG. 1

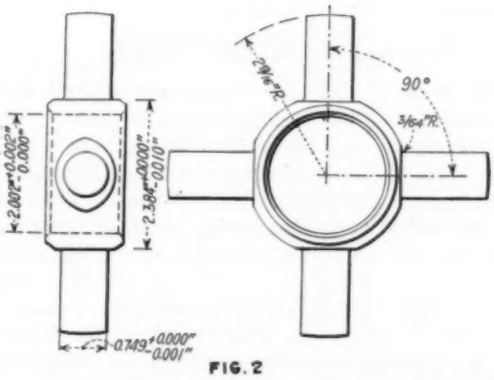


FIG. 2

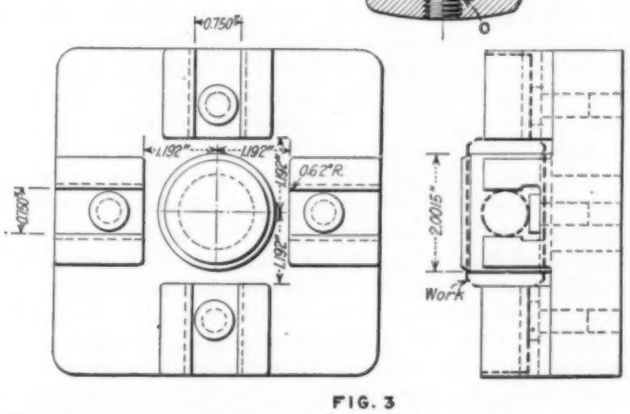


FIG. 3

FIG. 1. TWO VIEWS OF THE GRINDING FIXTURE. FIG. 2. THE SPIDER TO BE GROUND.
FIG. 3. THE GAGE FOR TESTING ALIGNMENT

D and *E* and slipped on the index plug *G*. It must be a close sliding fit. The U-washer is slipped into place again and the clamp nut *E* is then tightened slightly at this point. The operator must next true up this first arm before tightening the nut *E*.

When this is done the operator is ready to grind the first spider arm. The wheel used for grinding the arms is a 2 x 18-in. wheel. Care must be taken that the grinding wheel is dressed straight and true.

After the first arm is ground to the proper size the clamp nut *E* is not to be loosened or tampered with in any way. To index the second arm the clamp nut *D* is loosened enough so that the spring *K* will lift the index plug *G* to allow the index keys on *J* and the slots in *H* (shown at *P*) to pass each other. The spider is then indexed 90 deg. The clamp nut *D* is next tightened and the operator is ready to grind the second arm.

The remaining arms are ground in the same manner as the second arm. Care must be taken in making this fixture to have the index keys 90 deg. apart and both the adjacent surfaces of *H* and *J* parallel with the horizontal centerlines *ZZ* and at right-angles with the vertical centerlines *YY*.

Effect of Heat-Treatment on Steel Castings and Drop Forgings—Discussion

By F. B. Bayless
Metallurgist, Oil Well Supply Co.

On page 413 of the *American Machinist* appears an article by A. A. Blue entitled, "Effect of Heat-Treatment on Steel Castings and Drop-Forgings." I do not agree with all of Mr. Blue's conclusions. Some of them remind us of the forging salesman who is too much a gentleman to openly "knock" steel castings, yet he "damns them with faint praise."

Mr. Blue writes that S. A. E. specifications cover only phosphorus and sulphur; but he does not state that under the heading "carbon," these specifications say, "As required for physical properties." While such specifications are not as definite as those imposed on forgings, they do place certain limits within which the casting manufacturer must keep his product. However, the steel casting specifications as set forth by the American Society for Testing Materials, are much more explicit. Here we find not only carbon, phosphorus and sulphur specified, but physical properties as well. Soft, medium and hard castings are covered, with tensile strengths from 60,000 to 80,000 lb. per square inch, yield points 45 per cent of the tensile strength, elongation in 2 in. from 15 to 22 per cent, and reduction of area from 20 to 30 per cent. The method of manufacture, analysis, heat-treatment, cold-bend tests, tests to destruction, etc., are also given. Surely a purchaser using such specifications would hardly agree that "a steel casting is a steel casting."

Heat-treated castings, especially for hardness, are coming more and more into favor. This is especially so since the advent of electric furnace steel, which has made possible the production of castings of very complicated design and thin section, and from the purest metal of almost any analysis. Electric steel castings are regularly produced with carbon contents from 0.30 to 1.10 per cent and within 10-point limits, manganese, phosphorus and sulphur being controlled as closely as in rolled stock.

I do not believe that the figures given in Mr. Blue's casting analysis table are representative, especially for electric and open-hearth steels. These steels when made in basic-lined furnaces would easily be of much lower sulphur and phosphorus content. The refining slags would take care of that; and if made on acid bottoms, purer metal would compose the charge, so that such high percentages of these two elements would be out of the question for a casting that required a degree of strength and toughness.

If castings are desired with properties approaching those of forgings, it would not be good policy to use metal of the same composition and give them the same heat-treatment. With the desired properties in mind, the steel and the subsequent treatment must be of a special nature. The treatment given a forging would hardly bring out the desired properties in a casting of the same analysis.

The simple fact that a certain part is made from a forging does not mean that this part might not fail, as eternal vigilance from the steel furnace all the way down the line to the piece ready to use must be observed, in order to develop to the fullest degree the quality of the part. It is not necessary for the buyer of steel castings to simply send his patterns to the foundry and receive just any kind of castings in return. Steel foundries today can and are supplying castings within very close limits as to analysis and physical properties.

The plant with which the writer is connected produces for its own use castings of grey iron, so-called semi-steel, malleable iron, electric-furnace steel, brass and bronze, as well as forgings. The decision to use one or the other is made after the properties and strength desired are decided upon. After it is all said, the one thing above all others that determines just what a given part shall be made of is this: "What material will produce this part, to meet the specifications, at the lowest cost?" There are many who jump from grey iron, semi-steel, or malleable to forgings, when the steel casting would fill the bill, and be a great saving.

Germany's Export Trade

The 1920 trade figures for Germany's exports to the various countries of the world naturally show a great difference from the pre-war figures. In the pre-war statistics Great Britain is shown as the largest consumer, taking nearly 15 per cent of the total German exports; the old Austro-Hungarian Empire comes second, with 11 per cent; and Russia, including Poland, third, with almost 9 per cent. France and the United States were next, with around 7½ per cent, closely followed by the Netherlands, which took close to seven.

After the armistice and resumption of trade great changes took place The neutral countries' markets were, of course, easier for Germany to regain, and the 1920 statistics show that the Netherlands imports from Germany increased from 7 per cent to almost 21½ per cent of the German total. Switzerland has gained the second place, with 9½ per cent, followed by the new States of the former Austro-Hungarian Empire, with 8 per cent. Denmark, which in pre-war days only took 2 per cent of the German exports, reached 6 per cent in 1920. Of Germany's former enemies the United States is the only country which so far has reached pre-war figures, having taken more than 7 per cent of Germany's exports in 1920. The reason for this lies in the purchasing power of the dollar as compared with the depreciated currency of other allied countries.

Front Axles and Steering Knuckles

Spring Actuated Drilling Fixtures Which Are Quickly Handled—Holding Long Work for Milling—Automatic Lathe Work on Steering Knuckles

BY FRED H. COLVIN
Editor, *American Machinist*

THE Peerless axle is of the I-beam type with the yoke at each end for holding the steering knuckles. It has the usual characteristics for a car of the size and weight on which it is used and some interesting fixtures have been devised for the various machining operations. The nine machining operations are as follows: Operation (1) straighten; (2) mill spring pads; (3) straddle-mill the ends; (4) bore and ream yoke ends; (5) drill eight bolt holes in spring pads; (6) spot face the eight holes; (7) counterbore for steering knuckles; (8) drill two holes for ⅛-in. pipe tap; (9) tap two ⅛-in. holes; (10) inspection.

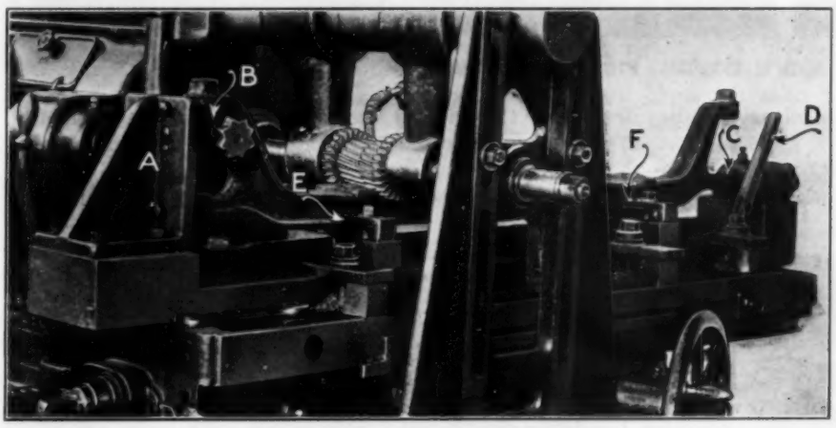


FIG. 1. MILLING SPRING PADS

The front axle is held for milling in a special fixture which is used on the Brown & Sharpe knee-type milling machine, shown in Fig. 1. One end of the axle is centered by the angle plate *A*, a V-block holding the lower end of the yoke, while the upper end is clamped by a hook bolt at *B*. The lower end of the opposite yoke is held at *C* while the gage *D* indicates how well the axle has been straightened after forging. The lower web is held by the bent clamps *E* and *F*, the whole fixture holding the axle firmly in position while the pads are being milled.

Located by the spring pad at *A*, Fig. 2, the yoke is straddle-milled by the four cutters shown. It will be noted that three of the milling cutters have the teeth cut with alternate angles.

In boring and reaming the ends the spring type of fixture shown in Fig. 3 is used. The upper plate is controlled by means of the lever *A* and the drill is guided into the lower hole by use of the bushings *B*. The jackscrews *C* take the thrust of the drilling cut. The two toolboxes each having six compartments for tools, wrenches, etc., are placed well out of the way and yet in a convenient position.

The holes in the spring pads are drilled in sets of four as shown in Fig. 4. The axle is located from the yoke hole in one end by the pin *A*, the other end being lined up with the support shown. The milled surfaces of the spring pads are forced up against the bushing plates *B* and *C*, by means of wedges operated by screws *D* and *E*. Four holes are drilled at one setting, the fixture then being moved for the next set of holes. The holes are counterbored or spotfaced at *F*, the axle being held in a vise and the work done by the single spindle shown.

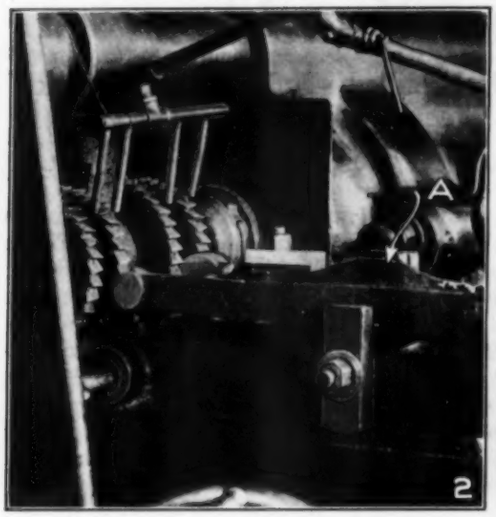
After inspection the axles go to the assembling department, a section of which may be seen in Fig. 5. Here the knuckles are assembled to the axles on the bench shown. The trial assembly is made at *A*, the bar *B* being fitted with suitable connections for testing the proper location of the steering knuckles in the axle. This view shows both king pins being put into place at *C* and *D*. The steering arms are tested as to position by the arms *E* and *F* on the bar *B*. The knuckles are finally fastened in position on the bench at *G*. This bench has special clamps for holding the axle, as can be seen. The completed axle units are then ready for inspection before assembling.

The steering knuckles are made of drop forged steel and require sixteen operations including the final inspection. The sequence of operations is as follows: Operation (1) drill and ream spindle hole; (2) spot-face to length and groove both ends of kingpin hole; (3) center both ends of stem; (4) rough and finish turn stem; (5) face to length and chamfer thread end; (6) drill and ream stop pin hole; (7) drill and ream taper hole; (8) spot-face back side of taper hole; (9) broach keyway in taper hole; (10) thread end of stem; (11) drill four cotter pin holes; (12) mill keyway in end; (13) hand ream kingpin hole; (14) heat-treat; (15) grind both diameters; (16) inspection.

A good example of spring-operated drilling fixtures is shown in Fig. 6 where three of these fixtures are mounted under a Foote-Burt three-spindle drilling machine with a single table. The upper and lower ends of the forgings are centered by suitable cones in the fixtures. The knuckle is drilled through while the forging is held by the double springs shown. The upper plate *A* can be raised by the levers *B*, acting through rods *C* at each end of the plate. This compresses the springs, allows the drilled piece to be removed and a new knuckle inserted. By lowering the leaves the new knuckle is held in position ready for drilling.

FACING AND TURNING

The ends are then spot faced to lengths and grooved in a Bardons & Oliver turret lathe as shown in Fig. 7. This view shows a stem which has already been turned, although that operation is in reality performed later, the piece being put in the machine to show how the work was held in the special chuck *A*. It also indicates that both the spot facing tools, as well as the outside milling and the grooving tools, are guided by pilots so as to insure concentricity with the kingpin hole



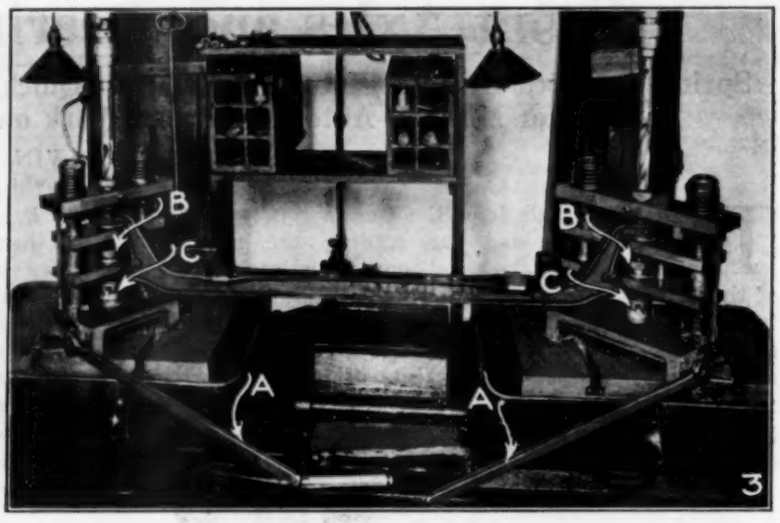
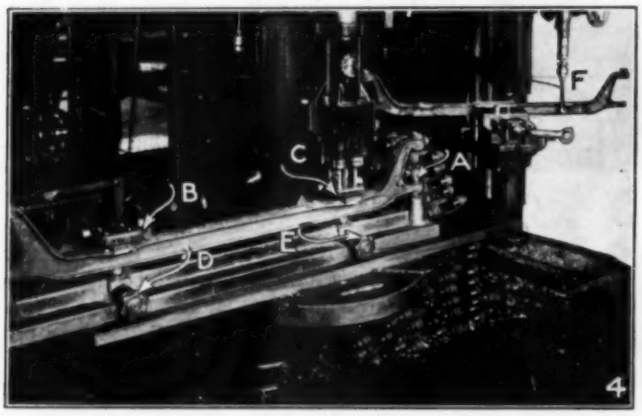


FIG. 2. MILLING THE YOKE. FIG. 3. DRILLING THE ENDS

already drilled. The type of cutters is clearly indicated.

The end of the stem is then centered, together with a corresponding point on the back of the knuckle so as means of the ear through which the steering arm fits. The stem is both rough and finish turned in this operation.

The stem is then faced to length and chamfered for



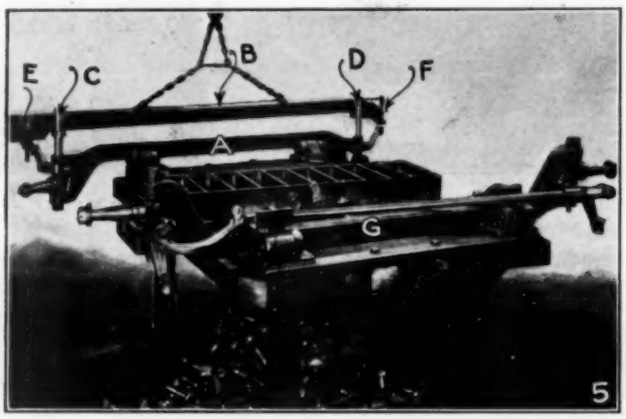
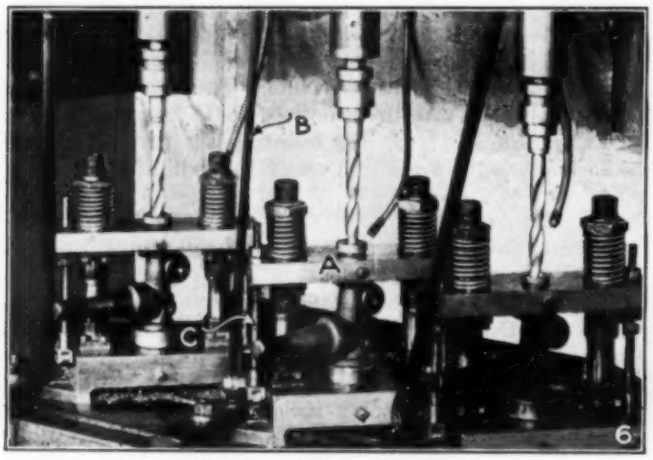


FIG. 4. DRILLING AND COUNTERBORING SPRING PADS FIG. 5. ASSEMBLING AXLE AND KNUCKLES

to afford an easy and substantial method of turning the stem for the wheel bearing. This turning is accomplished in a Fay automatic lathe as shown in Fig. 8. The forging is held between centers and driven by the threaded end. Next comes the drilling and reaming of the ½-in. hole which is used for the steering stop in Fig. 9. This hole is drilled clear through so as to be usable from either side. It will be noted that the



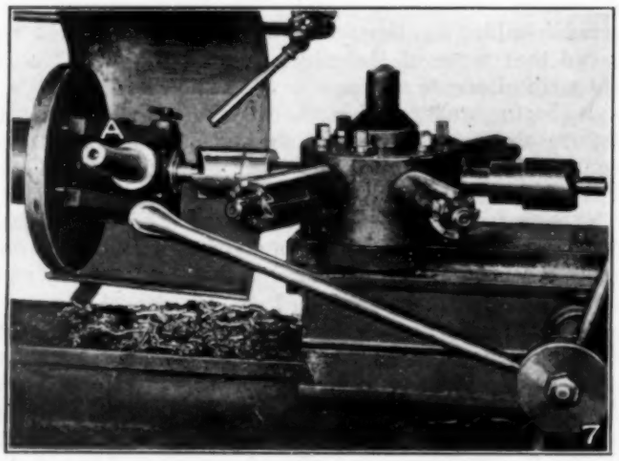


FIG. 6. DRILLING KINGPIN HOLE FIG. 7. FACING ENDS AND GROOVING

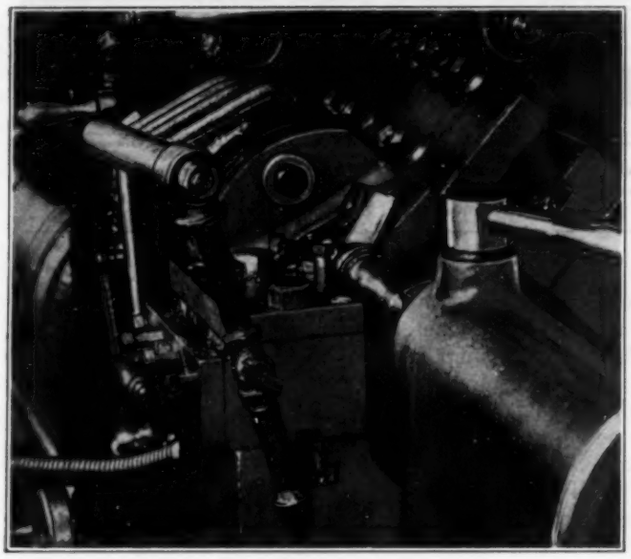


FIG. 8. TURNING THE STEM

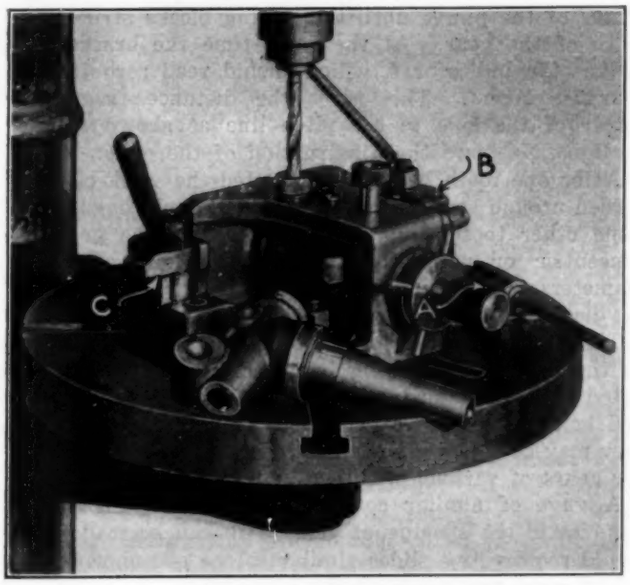


FIG. 9. DRILLING FOR STEERING STOP PIN

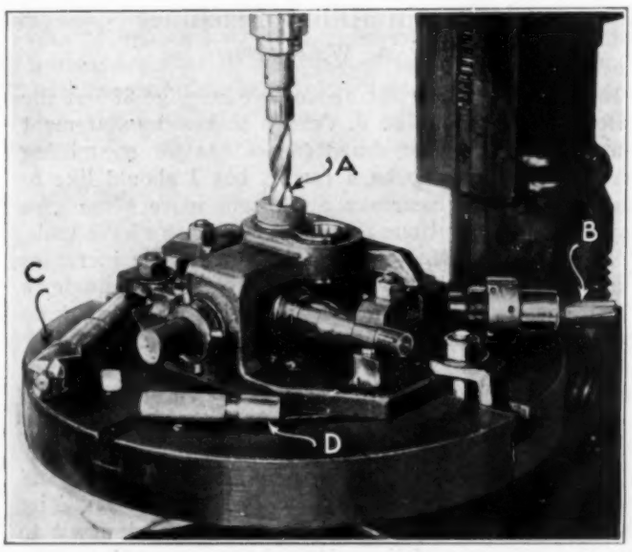


FIG. 10. DRILLING AND REAMING FOR STEERING ARM

knuckle is supported by the pin *A* which centers it, the end being clamped by the hook *B*. When knuckles are being drilled left-handed the other side of the fixture is used. In this case the clamp *C* holds the end in position.

The drilling of the taper hole is accomplished in a similar fixture, as shown in Fig. 10. This view shows the knuckle in place and the hole being drilled at *A*. It also shows the taper reamer at *B* and the spot-facing cutter at *C*. The gage is shown at *D*. The remaining operations are outlined in the operation list given at the beginning.

Painting Machine Tools White

BY ELLSWORTH SHELDON

The advantage of painting the interior of shops white for the purpose of reflecting and diffusing light, thus lighting up otherwise dark corners and obscure places, has long been recognized. Not only does it increase production and assure more accurate and careful work from physical reasons alone, but its effect upon the temperament of the operatives is even more far-reaching.

Unquestionably dark walls and ceilings absorb light and upon dull, cloudy days render the shop atmosphere dismal and depressing; under these circumstances no worker, however willing, can give his best service.

Though many shop managers, probably most of them, acknowledge the advantages to be obtained and ungrudgingly sanction the expenditure of the time and money necessary to keep their shops up-to-date in this respect, the prevailing colors of machinery and machine tools still remain black or dark grey.

The first machine tool, if it was painted at all, was probably black, and except in sporadic cases where some intrepid proprietor has essayed a departure from time honored custom by painting his machinery a dark green or red, the dull colors still persist.

The shop of H. Bickford & Co., situated upon the shore of Lake Winnipesaukee, where, if anywhere, light and sunshine should abound, was by no means dark. The walls and ceilings were white and the floors and machinery were kept clean and neat, so that full advantage was derived from outdoor light.

There was one corner, however, where an engine lathe and an automatic gear cutter were so situated that the lathe operator could keep his eye on the gear cutter and see that it attended strictly to business, that did not have as much light as the rest of the shop. The proprietor decided to paint both of these machines white.

An enamel paint, that because of its hard exterior surface would not be discolored by oil and grease, was used, and the result in lightening up the corner was far beyond expectations. As the pleased operator enthusiastically expressed it, "the sun shines all the time now."

The experiment was tried over a year ago, and so satisfactory was the result, that the practice is being extended to all the machines in the shop. The effect is such as to impress upon the casual visitor the belief that artificial light is being used.

It is no more trouble to keep the white surfaces clean than would be required by the dark ones, and dirt is so much more conspicuous that the operators are inspired to keep their machines really clean, instead of allowing dust and grease to accumulate, as is quite likely to be the case upon the dark colored surfaces where "the dirt don't show."

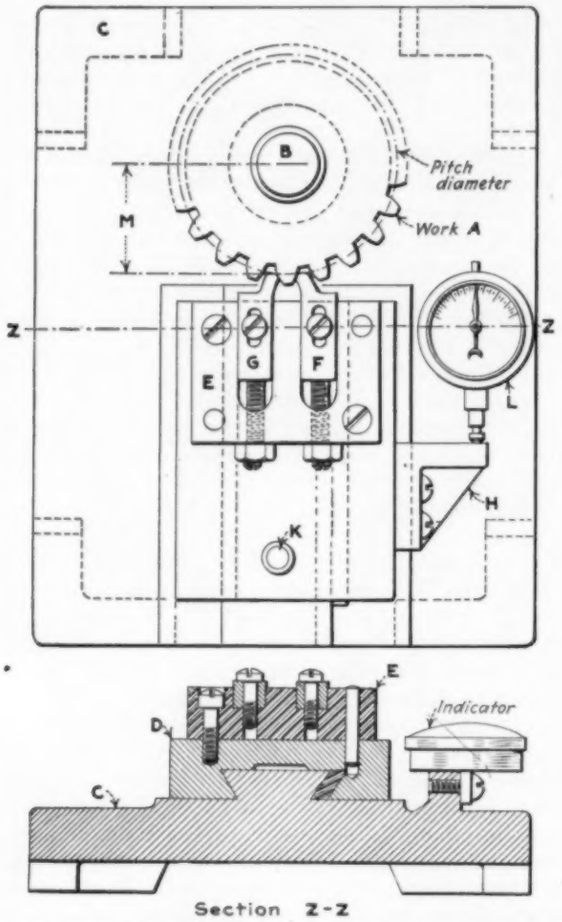
Ideas From Practical Men

Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered and those published are paid for.

Gage for Testing Spur Gears

BY GENE PHELPS

The most important inspection requirement of spur gears is that they must run quietly. This covers most any defect possible. In the manufacture of gears it is necessary to approach the most efficient tooth form in order to avoid friction. The most important factors



GAGE FOR CHECKING THICKNESS OF GEAR TEETH AT PITCH LINE, MEASURING PITCH RADIUS AND CHECKING CONCENTRICITY

which govern the inspection of spur gears are the outside diameter, pitch diameter, thickness of tooth at pitch diameter and concentricity of teeth with center of rotation.

The outside diameter is important because the thickness of the tooth at the pitch line is generally measured from it by means of gear tooth verniers. The pitch diameter must be held accurately in order that the gears mesh properly together. Gears which are not concentric and with teeth cut slightly off center, are noisy and inefficient.

There are many ways of inspecting the form of a gear tooth, the simplest of which is a templet gage. The outside diameter of a gear blank is generally checked by a snap gage or micrometer.

Inspecting the concentricity of a gear requires a special form of gage. The illustration shows a very good gage for this operation. The work *A* fits on a stud *B* suitably fastened on the body of the gage *C*. The slide *D* has a block *E* fastened to it and onto which are located two gaging blocks *F* and *G*. These gaging blocks are set to conform with the thickness of the tooth at the pitch line. On one side of the slide is fastened a bracket *H* as shown. The slide is moved forward by means of the pin *K* until the gaging blocks strike the tooth of the gear. At the same time the bracket *H* strikes the indicator *L* which should read zero if the gear is correct. This gives the distance from the center of the hole to the pitch line as shown at *M*. Section *ZZ* shows the construction of the gage.

After one tooth has been inspected the work can be turned around so that the gaging blocks will engage in some other tooth, thus showing whether the gear is concentric or not. Undersized and oversized pitch diameters are easily detected and at the same time both the distance *M* and the concentricity are shown.

The indicator is set to zero by putting a master gear on the stud *B* and gaging it as mentioned. It will be noted that the gage blocks *F* and *G* are fitted in slots and held in position by screws. This is done so that they may be removed and replaced by other gage blocks for gears of various pitch.

A gage of similar construction for checking inaccuracies in the spacing of gear teeth can be made but would require two slides similar to the one shown and would gage two teeth at the same time.

Chatter in Milling Machines

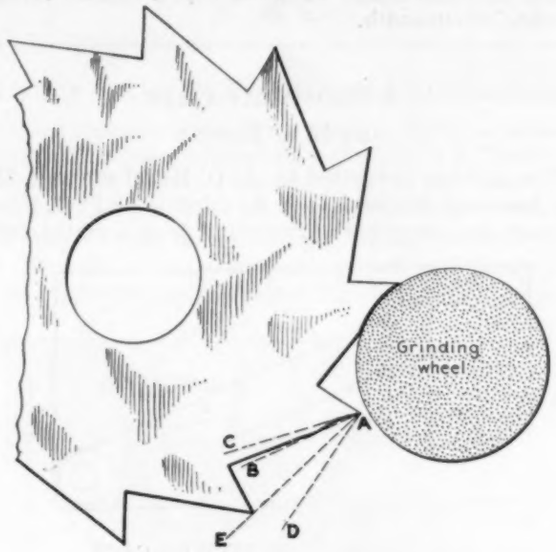
BY A. W. FORBES

In an article under the above title on page 386 of the *American Machinist*, P. V. Vernon makes the statement that having tools too sharp causes chatter on milling machines. This may be a factor, but I should like to suggest that the clearance angle will more often give the results he mentions than the sharpness of the tools. It is well known that a large clearance angle increases the tendency to chatter on many tools. This angle is often greater on milling cutters than the machinist realizes, due to common methods of grinding.

The accompanying illustration is purposely exaggerated and the grinding wheel is drawn smaller than usually used in order to make the effect much more noticeable.

The actual clearance angle is *CAD* on the figure and is the angle between the tangent to the curve made by the grinding wheel at the point *A*, and the tangent to the circumference of the cutter at the same point. The

machinist in looking at the edges will see the curve made by the grinding wheels as a straight line *AB* and the clearance angle will appear to be *BAE*. Now if an



CLEARANCE ANGLES ON A MILLING CUTTER

oilstone is held against the cutter as described by Mr. Vernon, one of the first effects of dulling the edge is to remove this excessive clearance right at the edge.

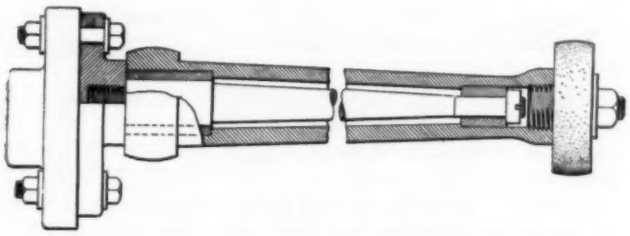
Grinding Automobile Cylinders in a Lathe

BY J. MCHENRY

While on a trip to the Pacific coast the writer saw a lathe cleverly adapted to the grinding of automobile cylinders. The essential parts of the grinding rig are shown in the accompanying sketch.

The grinding wheel spindle was a cast-iron sleeve of sufficient length to enter the ordinary cylinder, and appeared to be somewhat tapering and about 2 in. in diameter at the center. The larger end was crowned to form a pulley of about 1½-in. face.

This casting was presumably cored throughout its entire length and the ends of the cored hole bored to receive bronze bushings. The hole at the outer end was threaded for a short distance and the bushing at this end forced in past the threads. The sleeve rotated upon a long stud, screwed into a block of cast iron which was in turn bolted to the small faceplate, or driver, of the lathe. Provision was made to move this block in or out from the center to adjust the wheel for different diameters of cylinder, and also



SPINDLE CONSTRUCTION OF THE GRINDING RIG

to feed the wheel outward for the successive cuts in grinding.

After the sleeve was placed over the stud a left-hand ring nut was screwed on the end of the latter, and, bearing against the bushing, served as an end thrust bearing as well as to hold the sleeve on. A short stud, screwed into the threaded hole in the end of the sleeve, was provided with collar and nut to hold the grinding wheel.

Power was delivered to the grinding spindle from an extra overhead countershaft located somewhat back of the lathe. A bracket, carrying a swinging idler, was attached to the headstock, and this idler served to maintain an even tension upon the 1-in. driving belt and to compensate for the slight eccentric motion of the spindle. The cross-slide had been removed from the carriage of the lathe and a suitable angle-plate substituted, to which the cylinder blocks were bolted.

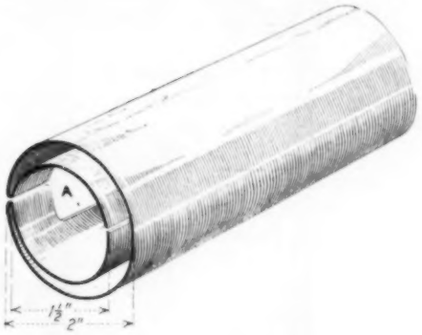
A Heater Connection That Saved Money for a Customer

BY I. B. RICH

One of my customers was fortunate enough to get a new car this year—a closed car at that—and he asked me to put his old heater in the new car. The old car had a 2-in. exhaust pipe while the new one was only 1½ in., so the connection with the heat deflecting valve didn't fit.

I called up the heater people to get a new connection and they were out of stock, wouldn't have any more for three weeks—in dull times too. Furthermore they said the price was $7.50 for a little cast-iron dufangle that I'd like to make for 75 cents, even in small lots.

So I got busy with a strip of sheet steel and a pair of tinsmith's snips, bent up the eccentric reducer shown



A SHEET-METAL REDUCER

beneath and cut out the opening *A* for the damper to come through. I trimmed the sides of the damper to suit a 1½-in. pipe and had the whole thing ready to put on in less than an hour. Scrap material and one hour's time—saved my customer $5 and three weeks' delay.

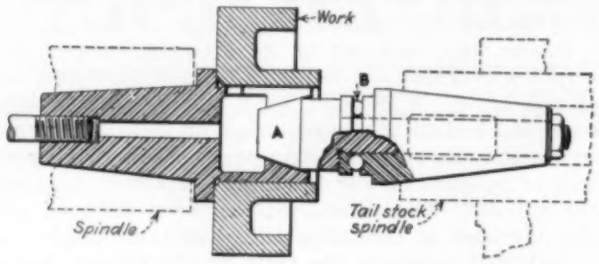
This charging of outrageous prices for fittings and small parts will react some of these days and we'll have a huge concern that will do things on the Henry Ford plan of charging a fair cost price plus a fair profit.

Expansion Arbor Operated by Tailstock

BY C. W. FRANK

The illustration shows a somewhat unusual way of operating an expansion arbor that has been used very successfully. In place of a draw bar or taper screw, a cone center held in the tailstock of the lathe is used. The arbor has three slots and the tailstock is brought up until the tapered portion of the cone center has ex-

panded it enough to grip the work. The taper should be less than generally used, so that it will not have a tendency either to back out or impose too much pressure on the ball bearing *B* which is used to take the thrust. The tailstock used on this arbor was of the quick-acting lever type, but the ordinary style with handwheel can also be used to advantage.



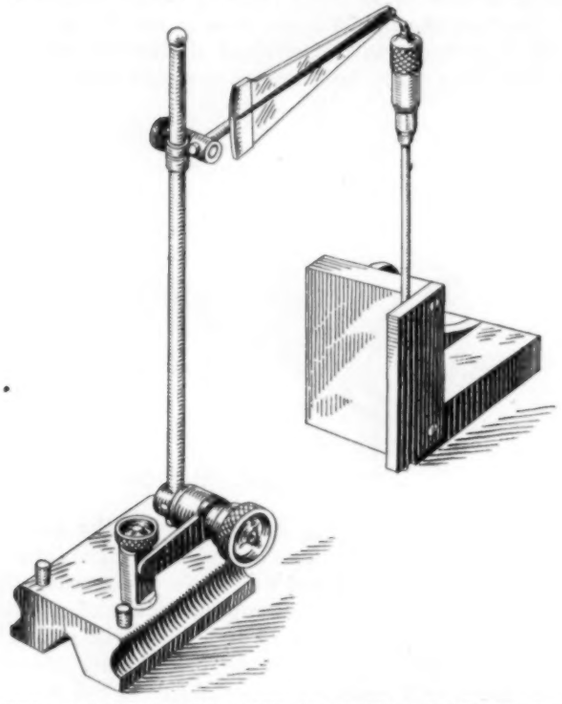
EXPANSION ARBOR OPERATED BY TAILSTOCK

An Improvised Height Gage

BY L. G. DICKINSON

Having occasion to gage a piece of work accurately for height, and no standard gage being available, I adopted the method outlined in the sketch.

With a small angle iron that was quite accurate and that had an extra piece attached to one side so that a rod could be held exactly perpendicular to a bench plate, I set my inside micrometer in the angle thus formed and held it in place while I passed the ball of a sensitive indicator over the measuring point, adjusting the surface gage to which the indicator was applied, until the dial of the latter registered zero.



USING AN INDICATOR AND AN INSIDE MICROMETER IN PLACE OF A HEIGHT GAGE

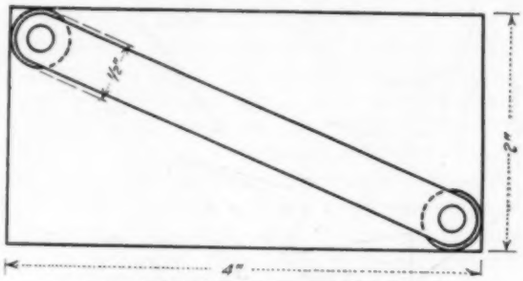
With the micrometer set to the required length, corresponding to the height of the piece to be gaged, it was a simple matter to determine the error in the work by passing the indicator in turn over the piece.

This method is even better than the use of the height gage, as the indicator unmistakably shows an error of one-half thousandth.

A Substitute Gage

BY R. K. ROWELL

The problem presented by A. D. Hallet on page 31 of the *American Machinist* and its solution by Prof. Pearse, on page 400, were both interesting from a mathematical standpoint; but as a gage for rectangular holes the device has little merit.



THE SUGGESTED TYPE OF GAGE

If two hardened and ground cylindrical plugs were used at the end of the bar as shown in the sketch, while presenting only a line contact for wear, they would stand up longer than the theoretical sharp corners of a square-end bar and when wear takes place the plugs could be revolved slightly, thus offering a new wearing surface.

The problem presented to find the center distance between the two plugs in this type of gage is an easy one to solve.

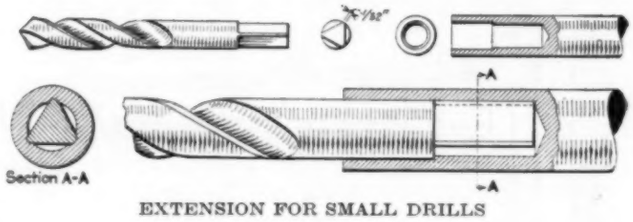
Solderless Extension for Small Drills

BY GEORGE P. NELSON

The small drill extension shown in the accompanying sketch has been used by the writer for a number of years, and I think it is superior to anything I have seen, for there is no soldering or fitting to it.

The shank of the drill is ground three cornered, leaving about $\frac{1}{32}$ in. land on the corners, and then ground square across the end to make these corners sharp; it is now really a broach.

The extension is drilled about $\frac{3}{8}$ in. deep, a snug fit for the drill to be used, and then drilled $\frac{3}{8}$ in. deeper with a drill about $\frac{1}{32}$ in. smaller. The drill is now driven into the extension, in which it broaches three grooves, holding the drill securely.



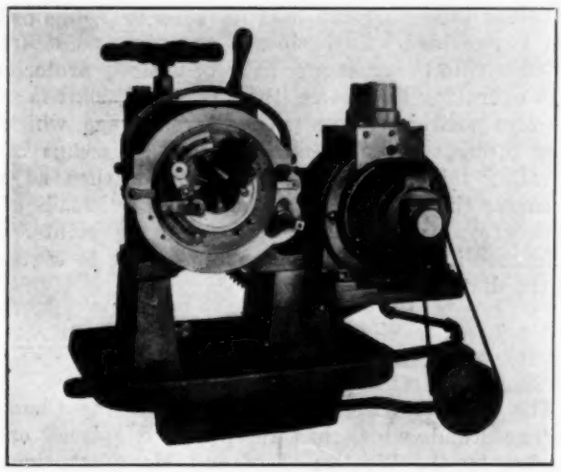
EXTENSION FOR SMALL DRILLS

This method is very satisfactory for putting taper shanks on small drills, for when the drill breaks or is worn out, it is easily replaced with a new one.

Shop Equipment News

Curtis & Curtis Pipe-Threading Machine

In the accompanying illustration is shown a machine recently placed on the market by the Curtis & Curtis Co., Railroad Ave. and Garden St., Bridgeport, Conn. The machine is known as the No. 430 Forbes direct-connected, motor-driven pipe threading and cutting machine. The head is mounted in a supporting shell and rotated by direct-connected electric motor through a train of gear-



CURTIS & CURTIS PIPE THREADING MACHINE

ing. Longitudinal travel is provided for the head, so that the dies may be fed on the pipe. The pipe itself is held stationary in a self-centering vise located on the rear of the shell. The advantages which the maker claims for the machine are small floor space, portability, and the fact that the machine can thread pipe bends.

The die head itself is encircled by two cast-steel rings forming a bearing against the cast-iron shell, and thus preventing chips from entering the gear teeth. The position of the dies is adjustable to fit the work, while the dies can be replaced if broken or worn. There is an automatic release and cam lock on the front of the head, which locks the cam during the threading operation and automatically unlocks and throws the dies open at the completion of it. The dies are then reset by the turn of a lever, so as to be ready for cutting the next thread. An automatic feed is provided for the cutting-off device.

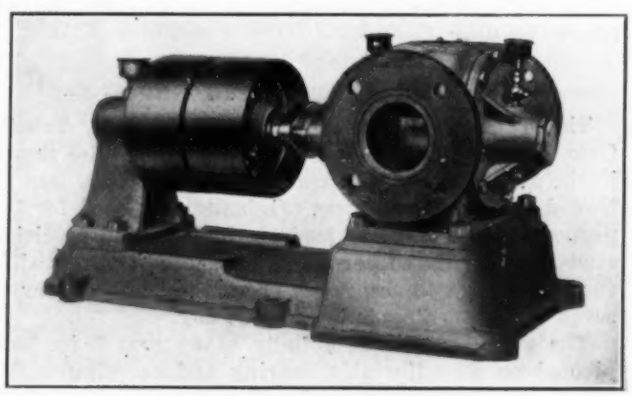
The gears used in the driving train are all of the spur type, and are protected by guards. A rotary oil pump delivers oil to the dies and to the cutting-off tool. The base is formed into a large drip pan and provided with a reservoir, into which the oil is strained. The machine as shown is intended for mounting on the end of a bench, but can be equipped with a floor stand and a high adjustable pipe rest, if desired. Three sets of three dies each are furnished with the machine, as well as three cutting-off tools. The machine has a range of ¼- to 2-in. right-hand threads, and requires a 1-hp. motor running at a speed of 1,800 r.p.m. The height is 20 in., the bench space required 24 x 16 in., and the net weight 350 pounds.

Exeter Rotary Pump

The Exeter Machine Works, Inc., West Pittson, Pa., has recently placed on the market a rotary pump made for the handling of liquid of practically any specific gravity. The pump is adaptable to use in a machine shop for circulating lubricating oil and coolant. In general, the principle of operation of the pump may be compared to that of the square-hole drilling device in which a triangular bit functions inside a square former It is in reality a three-tooth gear meshing with an internal four-tooth gear set eccentrically to it. The contacting surfaces consist entirely of circular arcs, and are said to give smooth rolling contact.

The inner rotor is keyed to the driving shaft, and both of the rotors are inclosed in a cylindrical casing. The outer rotor has four ports which open into the chambers of both the suction and the discharge side of the pump during rotation. The ports are closed momentarily by a lip at both the top and bottom of the pump body, in order to effect the cut-off between the suction and the discharge parts of the cycle. The liquid is drawn into the pump through the ports while the size of the pocket between the two rotors is increasing, and it is forced out at the opposite side of the pump during the last half of the revolution, when the size of the pocket is decreasing. The outer rotating member has a running fit in the casing on its periphery, being otherwise free and receiving its rotating motion from the inner rotor.

The pump has no reciprocating parts; it operates at comparatively slow speed and delivers a continuous flow of liquid. It is stated to be practically noiseless, and to be but little affected by wear. Due to the fact that the pump is positive in its action, it is stated to be able under normal barometric conditions to give 28 in. of vacuum, being run with a small liquid seal. Small pumps so far tested are said to have shown a volumetric efficiency of 98.67 per cent, and a pumping efficiency between 70 and 82 per cent. A pump of the same style



EXETER ROTARY PUMP

can be furnished with the body so strengthened as to operate against a pressure of 600 lb. per square inch.

The suction life is dependent upon the size and speed of the pump, and the nature of the liquid to be pumped.

Spindle-type Grinding and Sanding Machine

The Wonder Grinder Co., 612 West 12th Street, Erie, Pa., has recently placed on the market the "Little Wonder" spindle-type grinding and sanding machine, intended particularly for internal circular grinding on both wood and metal. The work-holding table of the machine is circular, as shown in the illustration herewith, and is provided with two bearings that enable it to be tilted 45 deg. to either side. It automatically locks in position at right-angles to the spindle, and may be set and locked in any desired position within its swing by means of a knob in front of the protractor scale.

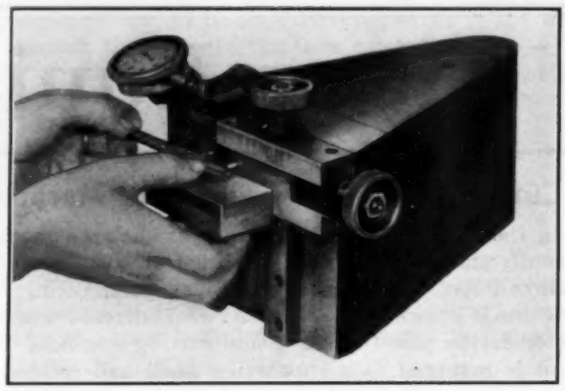
The spindle or roll for carrying the abrasive is mounted on a vertical shaft, and driven directly from a ¼-hp. electric motor mounted vertically in the base of the machine. Provision is made for easily removing the motor when desired. The spindle runs at a speed of 1,725 r.p.m. The top bearing of the spindle is adjustable to compensate for wear, and is provided with a grease cup. The spindles are 9 in. in length and provided in diameters of 1¼, 2¾ and 4½ inches. The oscillation of the spindle is ⅞ in. The motor can be furnished for the type of current that is available, whether direct current or alternating current of 25, 40 or 60 cycles. The controlling switch is placed on the front of the column. The table of the machine is 20½ inches in diameter and the height 37 inches above the floor.

"LITTLE WONDER" SPINDLE GRINDING MACHINE

Toledo Thread-Lead Gage

The Toledo Tap and Die Co., Clinton St., Toledo, Ohio, has recently placed on the market the device shown in the accompanying illustration for gaging the lead of threads. The machine was originally developed for the purpose of checking the lead on the taps and precision studs made by the concern, and it is stated to be possible for an operator to accurately check the leads of four to seven thousand threads in an 8-hr. day.

The gage consists essentially of an arm 8 in. long pivoted on an adjustable bearing and carrying at its outer end a suitably hardened and ground point to engage the thread to be tested. This point is connected with the dial gage, and registers the accuracy of the work. One of the measuring points is movable, and can be set within a range of from ½ to 2 in. Since it is necessary to test the lead at the center of the work, an elevating table that can hold work up to 2 in. in diameter is provided. The arm and the pivot point are inclosed within the casing, so as to be entirely protected.



TOLEDO THREAD-LEAD GAGE

In operating the device, the adjustable point is set to the zero position from a master thread gage, which has been brought to the center position by means of the elevating table. The elevating table is then adjusted to center the work to be tested, and the threads of the work are pressed against the measuring points. Any difference in lead from the master setting is registered on the dial gage.

"Champion" Garage Stand

The accompanying illustration shows the Champion garage stand, which has recently been placed on the market by the Western Tool and Manufacturing Co., Springfield, Ohio.

The stand is made of steel throughout, the trays being of pressed steel, and the whole being supported by a frame of heavy pipe. The vise used is the company's plain-jaw "Champion" vise No. 13. A drawer is provided for tools. An important feature of the stand is the brake which can be operated very easily by the lever underneath the vise. When locked, the brake prevents movement of two of the casters, thus providing a substantial work-bench.

"CHAMPION" GARAGE STAND

Specifications: Height, 39 in. Length: top shelf, 42 in.; middle and bottom shelf, 43 in. Width: top shelf, 14 in.; middle and bottom shelf, 26 in. Drawer, 14 x 14 x 4½ in.

EDITORIALS

Relief Afforded by the New Tax Law

THE Revenue Act of 1921 has received scathing criticism from all over the country. If the critic can see good in one section, there are certain to be others which he can shoot full of holes. Taken as a whole it represents a distinct failure to fulfill the pre-election pledges of both parties, and will fall far short of stimulating business revival to the extent hoped for by the people.

The failure to reduce surtaxes and eliminate excess profits taxes for 1921 is worthy of the severest condemnation and is perhaps the greatest fault in the bill as passed. Some Congressmen are going to find it difficult to explain their votes on these provisions when they come up for re-election.

However, a close reading of the bill will disclose certain sections, and parts of sections, which afford considerable relief from some of the onerous requirements of the older tax laws. Some of these are so important that we have thought it worth while to secure the opinion of a tax expert on them for the benefit of readers of the AMERICAN MACHINIST. His analysis of the tax law is, of course, not complete, but it brings out the possibilities of relief underlying some of the sections mentioned above. We have given his article leading position.

The Importance of the Railroad Shop Executive

A RECENT editorial in *Chemical and Metallurgical Engineering* pointed out very forcibly the blight of financial methods on technical enterprises. In no case is this more noticeable than with the railroads of the country. The technical engineer and the practical shop executive have been too long ignored or given too little consideration, not only for their own good, but what is even more important, for the good of the railroads and of the transportation of the country.

The executives in the mechanical departments of the railroads have been handicapped in many ways. They have been asked to do the impossibe in maintaining locomotives and rolling stock efficiently with inadequate tool equipment. Locomotives have increased greatly in size and in hauling capacity, and cars in tonnage; but in too many cases the machine equipment of the shops has not grown to keep pace with the increased demand. In many shops it has not even been kept in the best possible condition.

Economical transportation is necessary for the carrying on of all business. This cannot be secured unless the mechanical department of our railways is given the machine equipment needed for keeping locomotives and cars in repair at minimum costs. Shop executives must be better recognized, both as to their importance and their remuneration; the latter has never been commensurate with their value to the railroads.

Unjust and wasteful labor conditions in the railroad shop must and will be eliminated. So must the wasteful financial burdens imposed by unfair leases and dividend guarantees. Both of these obstacles should be overcome by negotiations which will avoid antagonisms and secure harmonious co-operation in the future. But the elimination of these wastes will not secure the greatest benefit, unless the mechanical forces of the railroads are given the opportunity to reduce costs in their departments with proper machine equipment. The mechanical executive is the key to successful railroading.

Adding to Selling Costs

BEFORE placing orders for a batch of machine tools, the purchasing agent of a large railroad recently interviewed a large number of sales representatives. It is said that about seventy-five men each spent from three to ten days endeavoring to convince the aforesaid purchasing agent of the desirability of buying his special machine.

It seemed to be one of the cases where the purchaser tried to see how much he could increase the selling cost to the manufacturer. Aside from the ethical phase of the question, this is bad economics. No matter which machines are finally bought, the total cost of having the seventy-five men attend the hearing, must ultimately be paid by purchasers of machine tools. The individual manufacturers who lost out on the order must be reimbursed for their expenses from other sales.

Buyers of machinery would do well to remember that manufacturers must pass all expenses, necessary or otherwise, along to the purchaser. Making it hard to sell machinery reacts on the buyer in the way of added costs all along the line. Some purchasing agents seem prone to forget this in their endeavor to make an impressive showing to their superiors as to their ability.

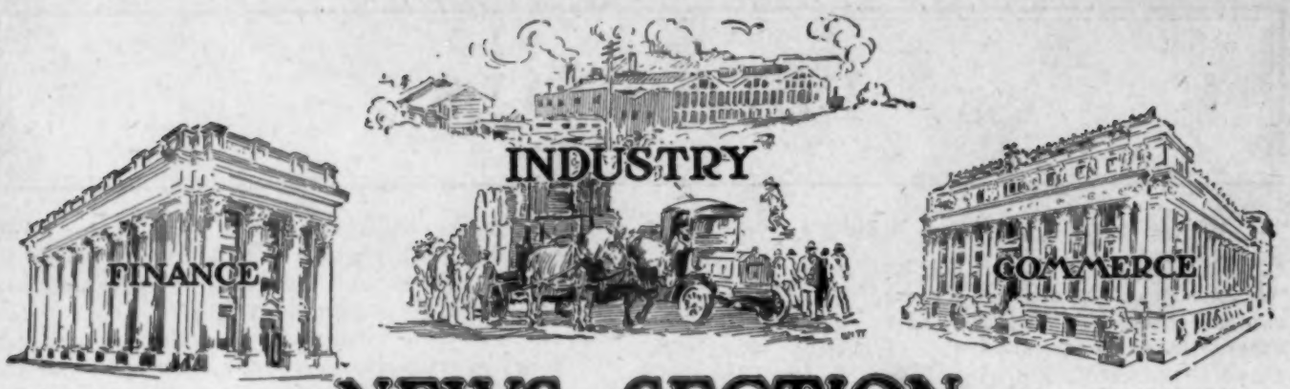
There is no more effective manner of cutting down industrial waste than to make it less expensive to get goods from the maker to the user.

High Priced Castings Delay Business

ONE of the stumbling blocks to machine building in some quarters is the continued high price of castings. Foundrymen who stocked up with high priced iron are loath to take a loss, and so continue to demand from six to seven cents a pound for castings. Orders would be placed on a basis of four to five cents a pound but the foundrymen are still refusing to pocket their loss in order to do business.

On the other hand, one foundry at least is offering to take work at less than three cents a pound. This is either because they were not overstocked with high priced iron or they have taken their loss in heroic doses in order to get things moving again.

As one manufacturer put it—"they are willing to reduce wages, which are a less important part of costs than they realize, but refuse to take a loss on their speculation in buying pig iron at the wrong time." Incidentally, the foundrymen are by no means the only ones in this class.



NEWS SECTION

New Offices of Allied Machinery Company of America

The Allied Machinery Company of America announces the removal of its offices in London to more suitable quarters at 70 Victoria St., S. W. 1. This street is one of the most prominent in London, and is the headquarters for most of the large engineering firms of England and the continent.

The offices of the company in Barcelona, Spain, were moved earlier in the year to larger and more commodious quarters that were erected especially for them at Consejo de Ciento, 318.

In Belgium, inability to renew the lease at 34 Rue Melsens forced the company to move to 52 Rue de la Montagne, where new quarters were especially fitted for them.

The company also announces the completion of its own warehouse in Paris, a building of steel and brick construction with traveling cranes, at 12 Rue Lieutades, Saint Ouen (Seine). The office quarters are still located at 19 Rue de Rocroy.

The company's offices in Turin, Italy, are not changed, although the receiving branch at Genoa, needed during the war to clear goods rapidly through the port, has been closed.

The company during the year has reopened its Switzerland branch at Zurich, and has re-stocked it from warehouses in Paris, Brussels and Turin.

The Allied reports that while business in Europe has been dull all year, a brisk revival has been noted since September which, with improvement in exchange, promises to continue. The company, while not expecting a large business in Europe for some time to come, predicts a gradual improvement and ultimately a more genuinely steady and profitable return than before the war.

Machine Tool Builders Hold Regional Meetings

Following out the policy of holding occasional regional meetings, the National Machine Tool Builders' Association held a meeting for the New York district members at the Hotel Astor on Dec. 13, and one for the New England members at the Hotel Bancroft, in Worcester, on Dec. 14. General manager E. F. DuBrul presided at the meetings and led the discussion on federal taxation problems and the possibility of association aid to the members in solving them. There was also some consideration of the budget and the method of assessing dues.

Du Pont Settles Oakland Rumors

The recent statement of P. S. du Pont, president of the General Motors Corporation, regarding the Oakland Division of General Motors, definitely settles rumors concerning the attitude of General Motors toward this division. The statement indicates that the Oakland Motor Car Co., will be developed and expanded to its full possibilities, along with the other units of General Motors.

Mr. du Pont's statement, in part, is as follows: "The Oakland Division is in a healthy condition, with its business stabilized and sales increasing. The present line of passenger cars, with gradual improvements, will be continued for the 1922 selling seasons. Thereafter, new models as may be required by the trade may be introduced."

W. C. K. Organize Alumni Association

One hundred and forty former employees of Westinghouse, Church, Kerr & Co., met on Wednesday, Nov. 30 and organized the "W. C. K. Alumni Association."

The object of the association is the maintenance of the friendships formed by the members during many years of service with the company. The periods of this service run anywhere from three years to twenty-five years, three years being the minimum requirement for membership.

The secretary, A. H. Tummel, 131 Warwick St., Brooklyn, N. Y., will be glad to hear from any former employees who are desirous of joining.

U. S. Steel Corporation Faces Charges

The complaint of the Federal Trade Commission against the United States Steel Corporation and its subsidiaries has been amended to make its charges more specific. The issue in the amended complaint is the same as that contained in the original complaint, which charges the corporation and its subsidiaries with discriminating in price between the purchasers of its rolled steel products. The amended complaint makes precisely the same charges with respect to each particular rolled steel product and charges that discriminations are in violation of the Clayton and Federal Trade Acts for the reason that they are not made because of any difference in the grade, quality or quantity of the product sold, nor because of different costs of selling or transportation, nor because the different prices were made in good faith to meet competition.

Dr. Klein's Report on Foreign Trade

Lower prices rather than diminished quantities, are responsible for the three billion dollars decline in the value of American foreign trade in the last fiscal year, as compared with the immediately preceding year, in the opinion of Dr. Julius Klein in his first annual report as director of the Bureau of Foreign and Domestic Commerce of the Department of Commerce.

A compilation of exported commodities, reduced, so far as possible, to a quantity basis, shows weight increases of 34 per cent for the groups of raw materials, and of 37 per cent for foodstuffs in 1921 over 1920, with a decrease of 4 per cent for such partly or wholly manufactured articles as can be shown in weight.

The final totals in this compilation, which included articles forming 69 per cent of the value of domestic exports in 1921, indicated that the exports of these goods increased 23 per cent in quantity over the amounts sold last year, though their value decreased 19 per cent.

The world-wide exchange situation, revived competition in foreign markets and decreased demand for American raw materials on the part of Europe, combined with a drastic cut in American imports of raw materials are the principal factors contributing to the lower foreign-trade totals.

The report refers to the fiscal year 1920-21 as "the most dramatic in the entire history of the foreign trade of the United States." The extraordinary episodes of that year in our business overseas resulted in a most severe strain upon the facilities of the Bureau of Foreign and Domestic Commerce; first, as a consequence of the "amazing strides" made by American export interests during the early months of the year, and secondly as a result of the disorganization and confusion which spread throughout the markets of the world with the accompanying panic of cancellations during the period of depression which marked the closing months of the year.

An unusual feature of Dr. Klein's report is a sixty-page review of world trade and of economic conditions in each of the important markets of the world.

Meeting at Birmingham

The Southern Supply and Machinery Dealers' Association has announced through its secretary, A. M. Smith, that it will hold its 1922 convention at Birmingham, Ala. The dates set are given as April 24, 25 and 26.

Sectional Meeting of S. A. E.

The meeting of the Metropolitan Section of the Society of Automotive Engineers on Dec. 15 was of unusual interest. After a get-together dinner, C. M. Manly gave a resumé of a paper prepared by J. G. Vincent on the trend of aircraft. He considers the lack of landing fields, the element of danger, lack of comfort and unsuitability of the power plant, as the greatest handicaps to its development at present. To these he ascribes the difficulty in securing the necessary capital and gives stalling near the ground as being the greatest real danger. He discussed thick and thin wings, the use of metals, both aluminum and steel alloys. He advocated the pioneer use of planes where there was no direct competition as a means of transportation, believing this will develop the demand as it did in the case of bicycles and automobiles.

Ralph Upson, one of the best known balloonists in the world, told of the development of air routes in Europe. The main difference is that our best example is the U. S. Air Mail Service, while their's is commercial and practically all subsidized.

European experience has shown that military airplanes are not adapted to economical commercial work and that the two services are different in many ways. He feels that we do not want subsidies, but we do need the passage of the bill now pending for a Bureau of Aeronautics in the Department of Commerce and the control of aerial navigation, which should accord as far as possible with the international codes adopted in Europe. The three objects to strive for are safety, economy and night flying. To this end Mr. Upson advocates the Government offering substantial prizes in lieu of a subsidy. He said in effect, "don't copy, stand on our own feet. The United States offers the best opportunities on account of our distances and the fact that we value time more than is done elsewhere." He pointed out that back of all the European subsidies and development was the military idea—the use in war—and urged that we avoid this because it would not develop the best commercial machines and because war should not be the prime motive.

C. F. Redder, general manager of the Aeromarine Company, that has done so much for commercial aviation, told of the work of that company and showed very interesting films of a trip from New York to Havana. These showed miles of beautiful shore which is inaccessible by rail or road but within an hour or less of large cities, by airplane. After people get accustomed to flying they will demand the airplane as a means of transportation. He advocated the establishment of landing fields in all towns as the surest means of securing commercial air travel.

Commander H. C. Richardson, now of the Naval Aircraft Factory, represented Admiral Moffat and told of the development of airplanes in navy work. He pointed out the difference between commercial and fighting planes, and felt that the main use of commercial aviation in war would be to form a base of supplies from which planes of military design could be quickly secured.

The use of planes makes it necessary to have them with the fleet, either on carrier ships or with fighting ships. The use of catapulting devices has proved very successful as well as a means for checking a plane's speed in landing. These he felt might make it possible to utilize large office buildings and railway terminals as landing platforms.

Among the needs of aircraft he mentioned metal construction, weather information while in flight, and a healthy public interest rather than a subsidy.

Other films followed, one by the Seaboard Consolidated Airline showing a trip around New York City and some intensely interesting views of the bombing of the German ships at the bombing test held last summer. The accuracy of the bomber was little less than marvelous, and when it is considered that the army planes had to fly from 60 to 100 miles out to sea, drop their bombs and get home, some idea of the reliability of modern aircraft may be secured.

Test of Safety Device for Stopping Trains

Before a representative body of engineers, railroad officials and safety experts a series of safety tests was conducted on Dec. 15 on the Raritan Railroad, running between New Brunswick and South Amboy, in New Jersey.

The subject of the investigations was an automatic induction device which has been patented by the M. V. All-Weather Train Control Co., Inc., of Newark, N. J. The device is said to be a distinct improvement over all such safety devices. Its operation is controlled by magnetism and it is claimed by the engineers that it will bring a train to a stop within a hundred yards after the mechanism has been set in operation by an obstruction on the track ahead. The equipment operates in sufficient time to avoid accidents by stopping the train some distance away from the point of danger.

Dr. Charles W. Burrows, magnetic induction expert formerly with the U. S. Bureau of Standards, assisted in the tests.

Employment Statistics

Increased employment is shown by the U. S. Employment Services report covering November in the following industries: Paper and printing; lumber and its manufacture; vehicles for land transportation; iron and steel and their products; tobacco manufactures, chemical and allied products; stone clay and glass products; textiles and their products; metals and metal products. Decreased employment was shown in the liquor and beverage industry, in railroad repair shops and in the food and leather industries.

While there were employment increases in 40 of the 65 cities, the total unemployment throughout the country increased largely due to seasonal and climatic conditions.

Foundrymen Dine

To celebrate a quarter century of existence, the New England Foundrymen's Association held a dinner on Dec. 14 in the Exchange Club, Boston, Mass. The event was held in honor of the past presidents of the association, who were all present as the guests of the organization. C. L. Newcomb, of the Deane Steam Pump Co., Holyoke, Mass., was the spokesman for the past presidents. C. S. Lovell, present incumbent, presided.

Foch Honored by Engineers

At an elaborate ceremony significant of the advancing movement to promote international peace through the furtherance of ideals on both sides of the Atlantic, Marshal Foch, soldier of France, was elected to honorary membership in the four leading engineering societies of the United States. The honors were conferred at the Engineering Societies Building, New York City, on Dec. 14, before a large assemblage of prominent engineers and scientists. The four societies which took part were the American Society of Mechanical Engineers, American Institute of Electrical Engineers, American Society of Mining and Metallurgical Engineers, and the American Society of Civil Engineers.

The presentation address was made by Col. William Barclay Parsons, chairman of the board of Columbia University, the commander of the famous 11th Engineers in the World War. Speaking for the engineers, Col. Parsons said in part: "The four national engineering societies of the United States now desire to make record of their appreciation of this fact and to convey to you an expression of their most profound admiration for the great leader of men by conferring on you honorary membership in all the societies, the highest honor in their gift and one hitherto never conferred on a single individual.

"Four thousand members of these societies were enrolled in the armed service of the United States, the greater part of whom had the glorious distinction to serve the common cause in France under your orders. Now we desire that you will still continue to lead us, but in peace, by permitting us to inscribe your name at the head of our roll of honor, where it will be, as your deeds have been, an example to us to do better work, and where it will remain forever a noble inspiration for all future generations."

Mr. Webster then presented to Marshal Foch the certificate of honorary membership.

In response to the presentation address, Marshal Foch said:

"It was due largely to the engineers and the engineering industries that the war was brought to a successful conclusion. The armies could not have accomplished much without the effort of the engineer. Success was made possible to a great extent by the industry of the people at home, but when decisive moments arrived the engineer stood out as an essential factor in attaining success.

"What would have become of the armies without the engineering industries and without the professional knowledge which you exercised and which enabled us to lead our armies in the field, to feed them, to protect them and to facilitate their forward movement.

"It is for these reasons that I am pleased to be here today, to receive so splendid a welcome, to express my gratitude and that of France and of all my countrymen for the splendid sacrifices made by the men of your calling. I am grateful to you for including me in your ranks as one of the members of your four national engineering societies. This honor I deeply appreciate, and I shall always cherish this event among the happiest memories of my visit."

The Business Barometer

This Week's Outlook in Commerce, Finance, Agriculture and Industry Based on Current Developments

By THEODORE H. PRICE
Editor, *Commerce and Finance*, New York

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In interpreting the week's news the philosophical business man will give first place to the advance in foreign exchange which carried sterling up to $4.24\frac{1}{4}$ and lifted other foreign currencies, including particularly francs, almost sensationally. Even marks sympathized somewhat in the improvement despite the fact that the German printing presses are still at work, and while there has been some reaction from the highest figures touched, the changed aspect of the foreign exchange markets connote the recovery in European credit that is requisite to and presages reconstruction.

This is directly due to the disarmament program and the four power treaty tentatively adopted at Washington, as well as to the settlement of the Irish question that now awaits ratification in London and Dublin. While all three of these great proposals have still to be approved of by one or more legislative bodies, their popularity with the people is so evident that there is hardly any doubt of their final confirmation, and in this assurance men are preparing to rebuild the world's economic structure with the hope and vigor that a consciousness of security inspires. Of course, it will take time to get all the wrecked machinery repaired and running again, but confidence, the first essential in the process, has been provided and with it there is no limit to what human enterprise can achieve.

Goods Instead of Gold

The preoccupation of the public mind with these larger aspects of the world's affairs has diverted attention from the routine details of the week's business news which are, to tell the truth, without any special significance except as they indicate a continued swing of the pendulum toward the median line of normalcy.

The figures of our foreign trade for November have been called unfavorable because they show exports valued at only $295,000,000 and imports worth $211,000,000, the resulting balance in our favor being but $84,000,000, as against $355,000,000 in November, 1920. As it is, however, impossible that we should continue indefinitely to buy more than we sell, this showing should not be surprising, nor is it to be regretted that we are now commencing to be paid in goods rather than gold for what we ship abroad.

Our continued importation of gold was becoming a menace, and while some large shipments are still on the way the rise in exchange seems to foreshadow a slackening of the movement and will operate to the advantage of our export trade, while it will tend to restrict imports as it increases their cost as measured in dollars.

The admission by the Department of Agriculture that it had previously underestimated this year's cotton crop by 1,500,000 bales and that the indicated yield is 8,340,000 bales has also been bearishly construed in some quarters, but as a matter of fact it has only served to bring out the inherent strength of the market, for most of the decline caused by the revised estimate was recovered when it became known that the consumption in November was the largest of any month since June, 1920. This increase in consumption affords striking proof of the real revival that is developing in the cotton as well as the woolen textile industry of the United States, and were it not for the surplus remaining over from last year a crop of less than $8\frac{1}{2}$ million bales would be regarded as utterly inadequate. Eighteen years ago in the famous Sully boom cotton went to over 17 cents upon the theory that a yield of 10 million bales meant famine, and when Europe regains its purchasing power the bullish implication of this year's deliberate curtailment of the yield will be more generally appreciated.

Lower Rail Rates Needed

There have been no striking developments or price changes in the other commodity markets. In the grain and live stock territory of the West and Southwest the low figures at which corn and cattle are selling continue to be the subject of bitter complaint, but the plight of the farmer is attracting so much attention and sympathy that remedial action of some sort is almost certain to be taken soon. The remedy most advocated is a reduction in railway freights and despite the protestations of poverty with which the railroads oppose lower rates, the probability is that public opinion will soon compel their adoption. One has only to read the "Congressional Record" to see that the agricultural prosperity that the Pacific Coast and especially the fruit growers of Oregon and Washington are enjoying is because they have cheap transportation to the markets of the East via the Panama Canal and is an object lesson that is having its effect upon the Congressmen from the land locked regions of the Middle West.

The bond market, which was somewhat reactionary early in the week, is again booming upon the sale of $55,000,000 New York City bonds due in 50 years to a syndicate that bought them on a basis that yields only 4.35 per cent. As this presupposes their retail distribution to investors, at a price the return upon which will probably be as low as $4\frac{1}{2}$ per cent or less, it is inferred that the bankers anticipate a further decline in the money market in the near future. This expectation is confirmed by the statement of the Federal Reserve Banks, which shows an increase of $18,000,000 in gold reserves and a reserve ratio of 72.6 as against 73.1 per cent a week ago.

The slight decline in the reserve ratio is probably due to year end tax payments and the delivery of the $250,000,000 Treasury certificates bearing interest at $4\frac{1}{2}$ and $4\frac{1}{2}$ per cent which, it is officially announced, were four times over-subscribed.

Stock Market Firm

In the stock market speculative interest is gradually spreading. The advances have not thus far been great, but they have been sufficient to inspire predictions of "a temporary recession" from the ever present reactionaries who take a short-sighted view of great market movements and cannot see that underlying the present demand for securities is a plethora of investment capital and gold that exceeds anything this country has ever known in the past. The low priced railway stocks compose almost the only group that has not thus far shared in the improvement. Their sluggishness is largely due to the persistence of the railway managers in advertising the poverty of their properties, while they are trying to reduce wages and maintain rates. Shrewd observers believe, nevertheless, that it is in this department of the market that the greatest bargains are to be found.

In London, as in the United States, the year is ending with what may be described as a condition of suppressed buoyancy in the markets and there is a growing feeling of confidence in the future. Germany, Russia and India are about the only really dark spots left on the world's map and to their illumination the world's statesmanship will shortly be able to address itself.

Germany has formally announced her inability to meet the reparation payments due in January and February unless she can negotiate a foreign loan. It is possible that such a loan will be arranged. Through America's peaceful penetration of Russia with food for the starving, it may be that the political sanity of the people can be re-established. It seems to be the only way and offers us a great opportunity.

As to India and the growing unrest there, all that can be said is that the problem is one in the solution of which the British Empire needs more than ever the marvellous genius of Lloyd George in compromise.

Machine Tool Trade in France

Foreign trade in machine tools has considerably advanced in France, both in import and export. Taking the 1913 figures of 237,350 quintals (quintal = 100 lb.) imports and 45,830 quintals exports, imports advanced 36 per cent in 1919, 239 per cent in 1920, and 149 per cent during the first eight months of 1921; exports decreased 11 per cent in 1919, increased 190 per cent in 1920, and 171 per cent during the first eight months of 1921. Germany's export of machine tools in 1920 amounted to 949,226 quintals, as compared with 872,775 in 1913, showing an increase of less than 9 per cent.

Technical Developments in Ordnance Department

At no time in its history has the Ordnance Department of the Army been engaged in such important technical development and research work as at present. Relieved as it is of the necessity to secure quantity production, the department is busy in an effort to improve the lessons of the war and to keep abreast with the revolutionary developments in automotive armament, in artillery and in airplane bombs. Major General C. C. Williams, the Chief of Ordnance, is just at this time concentrating much of his personal attention on the matter of bomb development. To his mind the bombing tests off Hampton Roads against the ex-German war vessels demonstrated that the powerful bombs that can now be dropped from airplanes constitute a menace fully as great as the submarine.

General Williams is also very much interested in the development looking to the compounding of the combustion engine. If crude oil can be used as the engine fuel for tanks, it will greatly increase the efficiency of that weapon, he points out. The weak point in the tank is the danger which follows any escape of gasoline. A very extensive research program has been carried on. The principal investigations were in connection with the auto-frettage method of gun construction, the proper heat treatment for nickel-chrome steels used in the manufacture of cannon having steel of high elastic limit, the inauguration of a program for the measurement of internal pressures in the bore of cannon, and a large amount of work pertaining to range finders and optical instruments of all types.

An innovation worthy of note has been introduced in the manufacture of guns and howitzers. In order to maintain a minimum weight of material, the elastic limit of gun steel has been raised to 80,000 lb. per square inch in some of the experimental types.

Several Accomplishments

General Williams cites the following as the chief accomplishments of his technical staff during the year:

Development of a time pressure gage based on the Piezo electric effect in quartz crystals.

Experimental study of the initial stability of projectiles and the causes and circumstances affecting their flight has been continued with the result of an accumulation of very valuable data. In connection with these firings there was also experimental study of the effects of air resistance upon projectiles fired with velocities higher than those obtainable in the experiments at the works of the General Electric Co.

Orders were placed with two private factories and with the Watertown Arsenal involving the manufacture of thin armor plates with various compositions and heat-treatments, with a view to the development and selection of the best combination.

A contract was entered into with the University of Michigan for conducting research work on small-arms cartridge cases; several reports were received and considered, which are expected to be of material assistance in the improvement of cartridge cases.

Study of the erosion of machine-gun barrels was continued during the year, and one set of 20 barrels of different compositions was completed, tested, and reported upon; work upon the second set of barrels is in progress.

During the year four meetings were held with the Society of Automotive Engineers, at which questions of automotive engineering were discussed with much benefit to the department's program of development of automotive material.

An ordnance division of the American Society of Mechanical Engineers was formed during the year, and held its first meeting at the Rock Island Arsenal, which was generally considered a most auspicious commencement of what, it is hoped, will be a mutually beneficial liaison. The liaison between the techincal staff and the Bureau of Standards has continued with satisfaction. The bureau had rendered valuable assistance in connection with several investigations.

Increase in Commerce Appropriations

In view of the propitious start made by the commodity divisions of the Department of Commerce, the President and the Director of the Budget have approved a request for an appropriation of $540,000 for the continuance of the work in the interest of the export industries during the next fiscal year. This is an increase of $290,000 over the amount appropriated for this work during the current fiscal year. It is proposed to set up seventeen additional commodity divisions. The iron and steel division is receiving an allotment of $17,000. The existing divisions are each alloted $15,000 for their annual expenses. It is planned that each of the new divisions is to be alloted $15,000.

It is proposed to establish new trade commissioner offices in Russia, in Greece, and in Canada. It is also the plan to undertake special technical investigations in connection with iron and steel in England, Belgium, Germany and France.

In addition, $213,650 is asked to promote the commerce between the United States and Latin America. This is an increase of $113,650 over the current year's appropriations. A portion of the increase is to be applied to the establishment of new trade commissioner offices in Cuba, Colombia, Uruguay and Venezuela.

For promoting commerce in the Far East, $235,630 is asked. This is an increase of $85,650. It is proposed to establish under that appropriation new trade commissioner offices in Delhi, Bombay or Calcutta and in Canton.

For Latin-American Trade

In the opinion of Southern manufacturers further expansion of the South's export trade with Latin America is assured if the United States Shipping Board will permit shipping board vessels operated by various North Atlantic companies, to stop at southern ports for cargo while enroute to South America. If this request is granted the board will co-operate with the South Atlantic Maritime Corporation which now operates in Wilmington, Charleston, Brunswick, Savannah and Jacksonville, and the plan is expected to open a vast potential market for various Southern products in South America. Lumber, naval stores, railroad equipment, machinery and supplies, and various other iron and steel products will probably be among the exports.

Taxes and Exchange Hamper German Competition

Rumors about the ability of German automobile manufacturers to outdistance their American competitors in the world's markets vanish as soon as distinction is made between domestic and export prices of motor vehicles, according to a statement by L. J. Ollier, member of the Foreign Trade Committee of the National Automobile Chamber of Commerce. Reports from abroad indicate that German factories are well occupied with domestic orders.

In Germany the pre-war custom was to quote lower prices for export trade than for domestic consumption. Because of changed economic conditions, the practice is of necessity reversed now, and motor vehicles for export must be sold at a considerably higher price than would be received in domestic trade.

Readers, seeing a list of domestic prices for German motor vehicles and failing to realize the difference between these and export prices, come to a hasty conclusion that German manufacturers are sure to be most formidable competitors of the American motor vehicle industry. A closer analysis will show just the opposite. A typical German automobile, supposedly of medium price, was recently quoted for sale in that country at 150,000 m. The prevailing exchange rate of the mark was then 1.38c., so that the domestic price of the vehicle figured $2,070 in American money. This, it should be remembered, is the equivalent of the price charged in the domestic trade in Germany but not that stipulated for export.

Red Tape Costs Money

To ship this car abroad, application would first have to be made for an export permit. Upon payment of a nominal fee, this would undoubtedly be granted, but under the stipulation that the sale be effected in gold currency and the exchange thus received made available to the Reichsbank. This monopoly in exchange by the Reichsbank has a direct relation to the reparation payments that must regularly be made to the Allies. By having sole authority to control transactions in gold currencies, the Reichsbank is afforded direct access to the money from which 26 per cent must be obtained for payment of the indemnities. A foreign purchaser would consequently pay for a German automobile a price fixed in gold currency and increased sufficiently to cover the export tax of 26 per cent. Instead of $2,070 as quoted to domestic users, the foreign purchaser would actually pay $3,608.20. Judged on the basis of prices for export rather than for domestic trade, the advantage of German manufacturers is not as great as is generally supposed and even shows further diminution where purchases of foreign raw materials are required in the manufacture of the exported article.

Reports from trade authorities abroad show that German automobile factories are congested with domestic orders.

An Opportunity

The American Welding Society is in receipt of a notice of two openings, with a large corporation, for salesmen on electric arc welders and welding repair jobs for the New York district.

The society will be glad to give any information to applicants who are able to show experience in this line.

Stutz Flays Metric Advocates Before Senate Committee

Hearings have been taken up again on the Ladd metric system bill by the sub-committee of the Senate Committee on Manufactures, of which Senator McNary, of Oregon, in chairman. As this is written those who oppose the bill are presenting their arguments. A voluminous brief was submitted by C. C. Stutz, of the American Institute of Weights and Measures. In addition to this brief, Mr. Stutz presented an oral argument in opposition to the bill. Among other things the brief discusses the metric system in its relation to the artisan, the householder, the farmer, the retail drygoods trade, the railroads, the grocer, foreign trade, education, educators, manufacturing chemists, fire insurance and machine tool builders; also the cost of the change to manufacturers, the metric equivalent scheme, conversion figures, fraud, the two systems in calculation, Japan and the metric system, currency and the metric system, existing demand for the metric system, and previous metric bills. The brief discusses the attitude of various industries toward the metric system; the failure of the system in Peru; exceptions to the metric law in Germany and a discussion of the use of the metric sytem in scientific work in England. Lists of anti-metric resolutions were presented as was a long list of objections to the bill and of answers to arguments which had been presented earlier in the hearing by those in favor of the legislation. Some of the arguments presented by Mr. Stutz follow:

"We are opposed to legislation aimed at making the metric system the single standard of weights and measures in the United States and involving thereby also the prohibition by law of the use of our present English system now employed by our people and in daily use with us since the days of the earliest settlements.

"We are opposed to installing the metric system by compulsion. Any existing system of weights and measures affects the daily habits of every inhabitant of the country. Experience has shown that it is impracticable to change such deep-rooted habits by law.

"The law of 1866 makes the use of the metric system permissible—those who want to use it can do so. In spite of this permission it has made little if any progress in the industrial and daily life of this country.

"The bill as a whole is loosely drawn, the relation of its various sections is obscure and indefinite and its real meaning is concealed.

"The metric system is devoid of the English system's handiness and convenience; its units are either too large or too small for everyday requirements of industry.

"From the English system many subdivisions have been dropped, having outlived their usefulness, thus proving the English system's adaptability to the requirements of progress. The metric system on the other hand presents a rigid structure incapable of modifications and requiring conditions to adapt themselves to its use.

"There are no specific advantages to the average citizen.

"The metric system can never get over the immense disadvantages due to the fact that 10 has only the factors 2 and 5, whereas 12 has 6, 4, 3 and 2.

"The binary division of a unit into halves, quarters, eights, etc., is the universal natural system. The division and subdivision of the units by 10 is artificial. Metric units are either too small or too large and, therefore, lack the convenience required for everyday use.

"The metric system possesses not even approximate equivalent units for important English designations constantly used, such as the foot and the inch."

Agricultural Information in Department of Commerce

The value of the Agricultural Implements Division of the Bureau of Foreign and Domestic Commerce is being recognized more each day by the manufacturers and exporters throughout the country. The work of this department is collecting trade information from all available sources, digesting and selecting it, and passing it on to the trade. It has become one of the biggest assets to machinery builders during the period of industrial reconstruction.

The department is co-operating with the National Association of Farm Equipment Manufacturers, which represents 75 per cent of the implement and tractor builders in the country. Through this agency the bureau is kept in close touch with the trade and has been of inestimable value to the association.

A good deal of information covering agricultural products is already available in the bureau and is now being selected and consolidated so that it will be at all times accessible. Another important source of information is reports received from abroad. These come from consuls, commercial attaches, and trade commissioners, and give information which is both first hand and up-to-date. Official publications of foreign countries furnish valuable information relative to domestic and foreign trade. The bureau receives about fifty publications and periodicals each month, from which all subject matter relating to the implement industry is digested and published in *Commerce Reports*, or sent out through the manufacturers' association.

A recent report of the implements division announces that agricultural implements manufactured in the United States during 1920 were valued at $343,382,000. Of this amount $46,270,000, or 13 per cent, was exported. During the same year tractors to the value of $165,809,000 were produced; exports reached $31,093,000, or 19 per cent of the total.

J. W. Duntley Killed by Auto-Truck in Chicago

John Wheeler Duntley, founder and one-time president of the Chicago Pneumatic Tool Co., was struck and killed by an automobile truck in Michigan Ave., Chicago, on Dec. 15. He was fifty-five years old.

Mr. Duntley was a pioneer in the manufacture and use of pneumatic tools, working with Charles M. Schwab to place them on the market. In 1884 he organized the Chicago Pneumatic Tool Co., and was its president until a few years ago, when he resigned to become head of the Duntley Automobile Accessories Co. He was also a director of the Taite-Howard Pneumatic Tool Co., of England.

Robert H. McKean Dies Suddenly

Robert H. McKean, manager of the credit department of the McGraw-Hill Company, Inc., died at his home on Dec. 17.

Mr. McKean's services began with the *Engineering and Mining Journal* in April, 1902, as assistant in the accounting department. Within two years he had been promoted to the position of head bookkeeper and at the time the paper was purchased by Mr. Hill he was in charge of the accounting department. About a year after the purchase of the *Engineering and Mining Journal* by the Hill Publishing Company, Mr. McKean was appointed manager of the *Journal*, which position he held until he was elected a director and secretary of the Hill Publishing Company. At this time he assumed the management of the credit department of the company. He was a director and secretary of the Hill Publishing Company until its consolidation with the McGraw Publishing Company. After the consolidation he became manager of the combined credit departments and held this position until his death.

Mr. McKean's loss to the McGraw-Hill Company, Inc., will be a serious one because of his unusual ability in his chosen work. His ready wit and keen sense of humor will be missed by his associates.

Georgia Rail Rates

The Georgia State Railroad Commission has again resumed hearings in Atlanta on a petition of the carriers for increased intra-state transportation rates in the state, products of iron and steel plants and machine shops of the state being scheduled for consideration. That the carriers will take virtually the same petition before other commissions in the Southeastern states immediately on completion of the Georgia case, is regarded as certain by southern industrial interests, which are combining their forces to defeat the efforts of the carriers for increased rates. A hearing is scheduled before the Alabama Public Service Commission to begin Jan. 9, 1922, and also to concern intra-state transportation.

An Oakite Sales Conference

Quite in line with the determination to build a bigger business in spite of hard times, the Oakley Chemical Co. held a sales conference in New York on Dec. 13, 14 and 15. Sales representatives from all over the country to the number of about fifty were assembled for a conference, both as to the sales and to the technical side of selling Oakite. The technical sessions were especially interesting and showed the great changes which have taken place in sales organization during the past ten years.

Live, interesting papers were presented by the most experienced men in the organization, among them being papers on cleaning with Oakite, especially the prevention of discoloration in metals which are to be plated or otherwise covered. The use of Oakite solutions with spraying machines and heated cleaning tanks were discussed at length and many interesting points were brought out.

A theater party and a banquet were provided as a relaxation from the three days' strenuous sessions.

Patent Office Must Have Aid

When Commissioner Newton was in charge of the Patent Office in July, 1919, he testified before a committee of Congress to the effect that the situation in his bureau was deplorable and that it was in a worse condition at that time than at any other time since he had been in the service. His service began in 1891. The present commissioner of patents in his report to Congress, points out that the degeneration has continued steadily since the testimony of Commissioner Newton. Between July, 1919, and June 30, 1921, the Patent Office lost 163 of its examiners. "These men," says the commissioner in his report, "were scientifically trained and also members of the bar. They have been replaced by inexperienced men, fresh from college, without any knowledge of patent law and without legal training." Continuing the reports says:

During the time the Patent Office has been losing the 163 men aforesaid, the number of applications received in this office has increased by leaps and bounds. The number of applications for patent has increased 34 per cent during the period under discussion, while the trade-mark applications increased 85½ per cent. There are now about 50,000 applications awaiting examination. It is further shown that a number of divisions are over eleven months behind in their work, and to illustrate the large turnover in the personnel, there is cited one of the chemical divisions where five out of the nine examiners have been appointed in the last few months. One out of every four examiners has resigned in sixteen months and more than one-half have resigned in 32 months.

Industry Held Up

It is shown that there are many industries which cannot enter into development work on account of the doubtful status of their applications for patents. A bill is now pending in the House, H. R. 7077, which is designed as an emergency measure to help relieve the situation.

The receipts of money for the fiscal year just closed increased from $2,615,697.33 in the previous fiscal year to $2,712,119.69. A net surplus of $284,342.93 was earned, and if the bonus be subtracted therefrom, the surplus amounted to $71,745.73, making the total net surplus to date, that is, the excess of receipts over expenditures during the history of the Patent Office, $8,376,769.29.

Emphasis is laid upon the figures given and the conditions cited to show that the volume of business presented to the Patent Office is altogether too large for the present personnel.

A Real Disarmament Conference

Rear Admiral David Potter, Paymaster General of the Navy, announces a series of conferences at which plans for the disposition of obsolete battleships will be discussed. Admiral Potter expects to discuss the matter with steel operators, shipbuilders, scrap-dealers, financiers and editors of technical and trade papers with the view of determining the best method of developing the ship-breaking-up industry in the United States and the disposition of the resultant scrap.

Coal Mining Machinery in British Mines

An increased use of mechanical appliance in British coal mining is disclosed by the official report of the chief inspector of mines which has just been issued. Less than 6 per cent of the coal mined in British pits in 1910 was obtained by coal cutting machines, while in 1920 the quantity thus obtained amounted to 13.2 per cent of the total production.

Comparative figures from the official reports, received by the Bankers Trust Company, of New York, from its English information service, indicate that in 1910 the tonnage cut by machinery was 15,747,558 tons; in 1920 that tonnage was almost doubled.

The use of electricity at British coal mines, for all purposes, continues to expand. In 1918 the horsepower of motors installed was 965,367; in 1920 the horsepower was 1,080,822, a gain in two years of approximately 12 per cent. Of the total number of mechanical coal cutters in use three-sevenths are electrically driven.

Navy Yard Workers and Wage Cut

With regard to navy yard wages, the Secretary of the Navy has the following to say in his annual report to Congress:

The act of July 16, 1862, requires that wages in navy yards shall conform, as nearly as consistent with the public interest, to those paid in private establishments in the vicinity of the navy yards. Therefore the department, on May 10, 1921, directed the convening of wage boards at navy yards and stations throughout the United States and at Pearl Harbor, for the purpose of collecting data and submitting recommendations to the department as to a fair and just rate of pay in accordance with the provisions of the law.

The department had the wage question considered with great care, local boards utilizing some two and a half months. These local boards received committees representing employees of the various trades and occupations and collected data, submitting recommendations to the department as to what they considered a fair and just rate of pay for employees at the yard in consideration of the data collected. In addition, the department appointed a commissioned officer of the Navy, a civilian official of the department, and a representative of labor to act as a reviewing board. This board received all of the reports from the yard boards, went into the matter from all angles, and submitted a unanimous report advocating various wage reductions, which has been adopted. It is worthy of note that the navy-yard employees are discharging their duties with their customary fidelity.

Bulletin of Engineering Advertisers

The Engineering Advertisers' Association, of Chicago, has adopted a new method of keeping its members advised on subjects related to their field, by the publishing of a monthly bulletin. This bulletin gives a digest of the proceedings of the association meetings and also furnishes facts and useful information on industrial problems.

The bulletin will be sent upon application to advertising managers of concerns selling technical engineering products.

Railroad Salaries

Architectural, chemical and engineering employees of the Class I railroads received an average compensation of $236 during July. This refers to employees of this type in Class A. In Class B the average earning was $185. Sub-professional engineering and laboratory assistants received $144, per employee. The total amount paid Class A architectural, chemical and engineering assistants was $603,268. Class B employees in the same work received a total of $585,203. Sub-professional engineering and laboratory assistants received a total of $371,245. The number of full time positions in the respective grades were as follows: Architectural, chemical and engineering assistants Class A, $2,504; architectural, chemical and engineering assistants, Class B, $3,082; sub-professional engineering and laboratory assistants, $2,464. The figures have just been made public by the Interstate Commerce Commission.

Total earnings per employee in July in certain other lines of work are as follows: General foremen, electrical transmission, $238; assistant general foremen, electrical transmission, $215; linemen, $159; electrical inspectors, $202; shop inspectors, $202; boilermakers, $162; electrical workers, Class A, $170; electrical workers, Class B, $167; electrical workers, Class C, $130; machinists, $159; molders, $128; skilled trades helpers, $115; laborers (shops, engine-house, power-plants), $94; common laborers (shops, engine-houses, power-plants), $82; stationery engineers (steam), $157; stationery firemen and oilers (steam and electrical plants), $130; laborers, coal and ore docks, $102; road passenger engineers and motormen, $250; road freight engineers and motormen (through freight), $190; road freight engineers and motorman (local freight), $251.

Ordnance Tests on Auto Tracks Prove Satisfactory

The ordnance department of the Army is very much pleased with the progress of experiments with light, flexible, fabric tracks for automobiles. The most encouraging results have been obtained from such a track which can be applied readily over the ordinary tires of a Ford car. The mechanical additions to the machine to enable it to use this track are simple and easy to install. It has been found entirely feasible to drive the car on this caterpillar tread at a rate of thirty miles per hour over very soft ground. An incident of the experiment is that there is no wear on the regular tires when the track is in operation. The same type of track has been applied successfully to Dodge and other makes of cars. Gratifying results also are being obtained in the application of the track to the mounts of heavy guns. It is very generally held that the greatest post-war advance in ordnance activities has been in connection with the motorizing of Army artillery and vehicles.

The ordnance department is about to complete a very extensive study of ballistics and other ordnance theories. A staff of computers has been busy for some time on new ballistic tables which will mark a great advance in the facility of computation. New range tables also are being prepared.

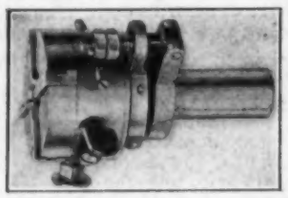
Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Instrument, Drafting, Precision, "Normal"
H. Lawrenz, 2533 McClellan Ave., Detroit, Mich.
"American Machinist," July 7, 1921.

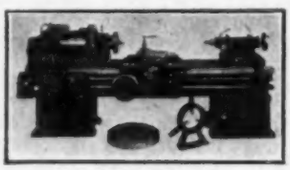
The instrument is intended for the drawing of circles from $\frac{1}{16}$ to 12 in. in diameter; and by the use of an extension bar, circles 24 in. in diameter. The instrument is shown in its case with two non-hinged ruling pens, as well as with the extension arm and the pen attachment. It is stated that the set is capable of performing all ordinary drafting work, since no small compasses are needed. The principal feature of the instrument is the fact that the two legs are always parallel, or normal to the plane of working. The instrument can be quickly set to the radius desired, and then clamped into position. The grip is made of aluminum, while the working parts are made of steel. The arms are rust-proofed by either of two methods.

Die Head, Self-Opening, Adjustable, Style DS
Geometric Tool Co., New Haven, Conn.
"American Machinist," July 7, 1921.



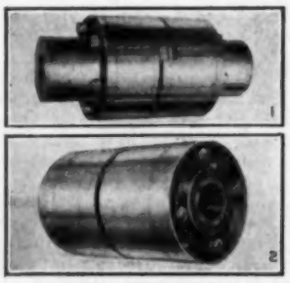
This die head was designed primarily for use with the Brown & Sharpe automatic screw machine, but is said to be quite as well adapted to other automatics. The spindle does not have to be reversed to back the die head off the threaded work. The head floats to suit the thread being cut. Buffer springs allow the head to yield slightly when the chasers come in contact with the work. Two check nuts at the side of the head provide adjustment of the point of tripping. A spring closing attachment is provided to automatically close the head when the turret revolves. The head is furnished in three sizes, $\frac{3}{4}$, $\frac{7}{8}$ and 1 in. The work that can be cut varies in diameter from $\frac{1}{16}$ to $\frac{3}{4}$ in., in length from $1\frac{1}{4}$ to $1\frac{3}{4}$ in. and in pitch from 10 to the finest desired.

Lathe, Cone-Head, Double Back-geared, 22- and 24-in.
Lehmann Machine Co., St. Louis, Mo.
"American Machinist," July 14, 1921.



This three-step-cone, double-back-geared engine lathe is built in 22- and 24-in. sizes. The bed has chilled ways and is braced by large cross-ribs. The V's are large, and have a total angle of 90 deg. The inside front way is flat. A rack is cast in the center of the bed for engaging the pawl on the tailstock. A geometrical progression of nine spindle speeds is provided in the head. The hardened spindle runs in hard bronze bearings. The apron has a central oiling system and a removable front plate, so that the mechanism is accessible without removing the whole apron from the carriage. The whole quick-change mechanism is a unit contained within a housing that can be entirely removed in a few minutes. The feed rod is not running when thread cutting, and the lead screw is inoperative when the feed rod is employed. All gears are covered.

Coupling, Flexible, "Cushion," Karge
Karge-Baker Corporation, Phoenix, N. Y.
"American Machinist," July 14, 1921.

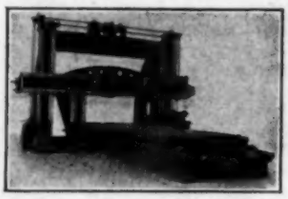


This cushion coupling is adapted to the connection of rotating shafts transmitting power, and it not only corrects for parallel and angular misalignment and permits armature float, but it also cushions the drive and absorbs the shocks occurring between the two shafts. The drive is transmitted through a helical steel spring of square section. The coupling is made in a variety of forms to adapt it to various uses. In Fig. 1 it is shown fitted with flanged ends carrying hubs to fit the shafts being connected. The standard coupling is made in sizes to transmit from $\frac{1}{4}$ to 160 hp. Fig. 2 shows the compression coupling. For cushioning shocks occurring in power transmission, the coupling mechanism is incorporated in the hubs of pulley and gears. It is also built integral with a friction clutch.

Pump, Oil, Hand
Rothweiler & Co., 2962 First Ave. South, Seattle, Wash.
"American Machinist," July 7, 1921.

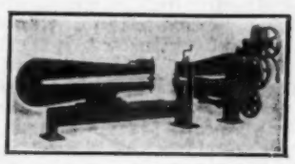
The pump is intended for the removal from the container of oil of any grade, gasoline, turpentine, paint or other liquids. The suction pipe at the bottom of the pump is placed down in the container; and a bushing on it fits either the $\frac{3}{4}$-in. opening in a steel drum or a 1-in. hole bored in a wooden barrel. The spout can be swiveled, being turned up after using, so that oil does not drop from it. The cylinder is made of steamless steel tubing, the valves ground, and oil-proof leather packings are used. The pump throws about a pint of oil at each stroke, so that 4 gal. per minute can be delivered, it is said. The weight of the complete pump is 7 pounds.

Planer, Movable Side-Rail, 13-ft.
Betts Machine Co., Rochester, N. Y.
"American Machinist," July 14, 1921.



The planer has one side head mounted on a vertical rail that can be moved relative to the table. The advantage of the arrangement is that work of different widths can be accommodated in the machine, and yet both side heads put in use without any undue overhang of either one. The machine has a capacity of 13 ft. 2 in. between the housings, 8 ft. 2 in. under the crossrail, and a planing length of 20 ft., although it can be furnished in any desired length. All four heads are equipped with patented feed and power rapid traverse arrangements. The feeds are entirely independent of each other in all directions. The drive is furnished by a 75-hp. reversing motor, giving cutting speeds of 20 to 40 ft. per minute. Forced feed lubrication is provided, and the oil is filtered by a Bowser oil-filter system.

Shear, Ring and Circle, No. 13-B
Niagara Machine and Tool Works, Buffalo, N. Y.
"American Machinist," July 14, 1921.



This deep-throat ring and circle shear is intended for work on light material. The machine not only cuts outside circles, but also internal circles or holes. It is also suitable for cutting reverse curves within certain limits. The upper cutter can be raised and lowered to penetrate the stock, so that the cut can be started in any part of the sheet, and not only on the edge. The slitting gage is readily adjustable for strips of various widths. The circle arm has a throat of sufficient depth to permit of cutting from square blanks the largest circles for which the machine is rated. An eccentric device is used for clamping, enabling the easy and rapid fastening of the work. A clutch, actuated by a hand lever, permits of stopping the motion quickly at any point. The machine is regularly furnished for bench use. Weight, 430 lb.

Pump, Rotary, Packing Gland for
Arrow Pump Co., Buhl Bldg., Detroit, Mich.
"American Machinist," July 14, 1921.

The concern is prepared to manufacture different types of rotary pumps in which are incorporated its own design of self-lubricating packing gland. It is claimed that the construction eliminates leaky glands and scored shafts due to improper lubrication at the glands. The cut-away view on the right side of the accompanying illustration shown the construction. The gland is applicable to any device requiring the packing of a rotating shaft. A ring oiling device is used. A constant and positive flow of oil is thus supplied to the gland and to the bearing which is part of the construction. The shaft is supported close up to the load. Soft, resilient packing is not used, as metallic packing affords all the resiliency necessary to completely seal without scoring the shaft. At the left side of the illustration is shown a centrifugal pump intended for circulating water on an automotive engine, and fitted on each end of the shaft with a gland such as just described.

Clip, paste on 3 x 5-in. cards and file as desired

Business Items

A report coming from J. J. Tynan, manager of the shipbuilding plants of the Bethlehem Steel Co., states that the steel works at Alameda, Cal., will be devoted to the building of Diesel engines. Plans are being formulated to start the program within the next few months.

The Exeter Machine Works, Inc., of West Pittston, Pa., announces the appointment of the following companies to handle the Exeter rotary pump line: Hodgard & Co., Chicago, Ill.; H. M. Stark Machinery Co., Detroit, Mich.; Vickes & Co., Seattle, Wash.; Reeves & Skinner Machinery Co., St. Louis, Mo.; Buckmaster-Luck-Walochee, Inc., New Orleans, La.

The American Bosch Magneto Corporation is reorganizing its system of distribution with a view to an intensified drive for the sale of its new line of automobile accessories and appliances. A council of branch managers and salesmen from different parts of the country was held at the plant in Springfield, Mass., Dec. 1 to 3. Numerous agency houses will be established to handle products under a contract arrangement. Among the score or more of specialties to be put on the market are a new battery ignition system, a new magneto for tractors and trucks, starting motors, magneto fittings, impulse couplings, switches, ammeters, spark plugs, and various tools and accessories.

The Connery Machine and Tool Co., Springfield, Mass., has bought a site for a new shop on Fisk Ave., and will erect a new building 150 x 50 ft. The company is manufacturing tools for several automotive industries in this vicinity.

The Robert M. Keating Co., Springfield, Mass., will soon place on the market an improved model of its silent flush valve. Tools for the work are now in making, and it is expected production will be reached in January.

The Liberty Pressed Metal Co., at Kokomo, Ind., a manufacturing concern that has been in the hands of a receiver since last February, was purchased Nov. 29 by J. W. Johnson, of Kokomo, and C. T. Byrne, of Chicago. The price paid was $65,000. The purchasers are interested in Kokomo industries.

The Loshbaugh & Jordan Tool and Machine Co., at Elkhart, Ind., has increased its capital stock from $50,000 to $110,000.

Announcement has been made at Indianapolis, Ind., that J. M. Neher has purchased the Model Machine Works, at Frankfort, from Perry Goble. Mr. Neher has assumed possession.

The Buffalo Machinery Sales Corporation has been organized at Buffalo, N. Y. Directors are A. M. Andresen, W. J. Hogg, E. G. Russ and G. W. Brunton.

The Terminal Iron Works has been organized at Stockton, Cal. Harry W. Fawke, formerly superintendent of the Moore Shipbuilding Co., and Edward McKarley are the owners. They have purchased the plant of the Stockton Iron Works and have leased several acres of land from the Southern Pacific R.R. for the construction of an additional plant.

Fenwick Freres & Co., of 8 Rue de Rocroy, Paris, France, will close its New York Office on Jan. 1. Lunham & Moore, of New York, will act as agents for the company in this country.

The Atlas Vise Co., has been incorporated to manufacture buy, sell and deal generally in vises and tools of all kinds. Principal offices are at Lowville, N. Y. Directors are F. M. Stricklan, E. W. Fulton, G. L. Fulton, Henry Pettie and H. W. Green. The company owns and controls patents for the Nutyp and Velox vises.

The Cincinnati Shaper Co., of Cincinnati, Ohio, has established a branch office at 940 Lemcke Annex, Indianapolis, Ind. T. C. McDonald has been appointed manager.

The Kendell Engineering Co., has been organized at Fort Wayne, Ind., by C. A. and R. L. Kendell. The company will manufacture a piston ring which is claimed to have several improvements and which is the invention of the Kendell brothers.

The Kemp Machine Works, Muncie, Ind., formerly manufacturers of aeroplane and marine motors, has changed to manufacturing pistons, piston rings, valves, wristpins and machine tools.

Legislation has been introduced into Congress providing for the extending of the term of the National Screw Thread Commission, for a period of five years from Mar. 21, 1922.

The Phoenix Sprinkler Co., of Springfield, Mass., recently filed papers of incorporation in Massachusetts, to make and install sprinkler systems, etc. The capital stock is $250,000. Chas. H. Atkins, Springfield is president and Fred G. Burnham of the F. G. Burnham Coal Co., Willimansett, Mass., is treasurer.

The Betson Co., Inc., New Haven, Conn., has been incorporated under the laws of the State of Connecticut to engage in selling tools, machinery, etc. The capital stock of the concern is $50,000. The incorporators are: W. C. Bettilyon, 280 Whalley Ave., New Haven; F. W. Pierson, and H. F. Parmalee.

The Gilbert & Barker Manufacturing Co., West Springfield, Mass., recently awarded five years' service pins to M. F. Bennett, of the Albany, N. Y., sales branch and C. W. Kincaid, of the Dallas, Tex., sales division.

The Hemming Manufacturing Co., 706 Howard Ave., Bridgeport, Conn., filed papers of incorporation Nov. 26, with the Secretary of State of Connecticut, to engage in the manufacture of metal goods, etc. The capital stock is listed at $25,000. Alex Berg is the president, G. A. Berg, secretary, and R. F. Clark, treasurer.

Unofficial figures indicate a production of more than 115,000 tons of pig iron in Alabama during November, according to William E. Dunn, Jr., of Atlanta, secretary of the Southern Metal Trades Association. Counting November, pig iron production in the state exceeded the 100,000 ton mark only four times this year. There was steady improvement in pig iron production during September, October and November of this year. A large part of the melt is being used by cast-iron pipe, sanitary pipe and fittings plants, many of which are operating at full capacity in the Alabama district.

Personals

A. A. ALBAUGH has been appointed vice-president and general manager of the Barnhart-Davis Co., Warren, Pa.

NELSON B. GASKILL, of New Jersey, has succeeded to the chairmanship of the Federal Trade Commission for a term of one year. Mr. Gaskill was appointed to the commission in December, 1919, to fill an unexpired term caused by the death of John Franklin Fort.

GEORGE K. VAIL, general manager of the Arthur G. McKee Co., Cleveland, Ohio, blast furnace and steel mill engineers, has resigned to become vice-president of the Ohio Steel Foundry Co., Lima, Ohio.

J. J. HERLIHY, successor to Charles N. Newman as division master mechanic of the Baltimore & Ohio, with headquarters at the Washington, Ind., shops, has taken up his new duties. Mr. Newman was promoted to the superintendency of the company's shops at Pittsburgh and left for that city last week. Mr. Herlihy comes to Washington from Parkersburg, West Va., where he was master mechanic.

HERBERT A. PIKE, president and treasurer of the Boston Pressed Steel Co., Worcester, Mass., has disposed of his interest in that business and has retired. His stock was purchased by William Sanger, of Toledo, Ohio, formerly general manager of the Clauss Shear Co., Fremont, Ohio, who has become treasurer. Douglas P. Cook, who was vice-president is now president and general manager.

THOMAS A. MCGINLEY has been elected director of the Westinghouse Air Brake Co., succeeding his father John R. McGinley, who recently retired.

J. M. MCNEAL, sales engineer of the Landis Machine Co., Waynesboro, Pa., has returned after spending a year and three months in England and the continent.

P. T. IRVIN has been placed in charge of the recently formed small tool division of the Greenfield Tap and Die Corporation, of Greenfield, Mass. Mr. Irvin was formerly sales manager of the Lincoln Twist Drill Co.

T. C. MCDONALD has been appointed local sales manager of the Cincinnati Shaper Co., in its office in Indianapolis, Ind. Mr. McDonald also represents the Reed-Prentiss Co. in that city.

B. H. ANIBAL has been appointed chief engineer of the Peerless Motor Car Co., of Detroit, Mich. Mr. Anibal recently resigned as chief engineer of the Cadillac Motor Car Co.

MARTIN G. SPERZEL has succeeded John D. Sells as sales manager of the Royersford Foundry and Machine Co., of Royersford, Pa. Mr. Seils has retired to private life, leaving his work to Mr. Sperzel who has been the company's sales engineer for a number of years.

V. A. ROOT, formerly with the Bausch Machine Tool Co., of Springfield, Mass., has been appointed assistant sales manager of the National Automatic Tool Co., of Richmond, Ind.

C. F. MEYER, assistant secretary of the Landis Machine Co., Waynesboro, Pa., has returned from a years trip in

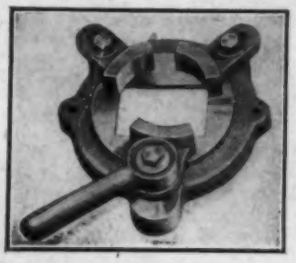
Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Vise, Piston, Universal

Manley Manufacturing Co., York, Pa.

"American Machinist," July 14, 1921



The vise is for holding automotive pistons while working on them, as when replacing the rings or wrist-pins or tightening the connecting-rod bolts. The device is said to be adaptable to all sizes of automobile pistons, hence is called "universal." It is intended for attachment to a work bench. The vise grips the piston by means of three jaws, the inside bearing surfaces of which are circular arcs. The front jaw is fitted with an eccentric operated by means of a small lever, so that the piston can be quickly released and clamped when once the jaws have been adjusted to fit it. The square hole in the center of the vise is for use when the connecting rod is attached to the piston that is placed in the vise, as the rod can be allowed to hang through the hole. The vise holds pistons from 2 1/2 to 5 1/8 in. in diameter. It is made of cast iron and weighs 15 pounds.

Wrench, Adjustable

Messers Huber & Dubs, Zurich, Switzerland

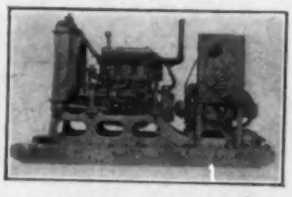
"American Machinist," July 14, 1921

The body and jaws are made in one piece of drop-forged steel. Between the jaws, as shown by the accompanying illustration, are placed a number of thin oblong plates 0.032 in. in thickness. These plates move on hinges, and can be turned back singly from their position between the jaws. In each position, they are rigidly held in place by a spring plate screwed to the body. The wrench is at present made in one size only, the jaw opening being adjustable from 1/2 to 1 in. It can, however, be produced in any desired thickness. The thin metal plates are made of hardened steel, and the spring and the plates are easily renewable. The chief claim is that the wrench maintains a constant distance between the jaws better than screw-adjustable wrenches.

Generator Set, Arc-Welding, Electric, Medium-Duty, WD-10

General Electric Co., Schenectady, N. Y.

"American Machinist," July 21, 1921



The equipment is intended particularly for intermittent work. The generating unit consists of a type WD-10 generator, directly connected by a flexible coupling to a Matthews, Model F, 4-cylinder, 4-cycle, 20-hp. gasoline engine. The engine, radiator, generator and welding panel are assembled on wooden skids. The set is 86 in. long, 28 in. wide, and has a net weight of about 2,000 pounds. The generator is self-exciting and regulating, and gives a no-load, or striking voltage of 60, which automatically decreases to the proper welding voltage, usually 18 or 20 volts, when the arc is struck. It is driven at a speed of 1,200 r.p.m., has a normal output of 4 kw. and delivers a maximum working current of 200 amp.

Screw Machine, Mechanical Control for, "Iron Man"

Pearson-Scott Co., 1523 East Washington St., Indianapolis, Ind.

"American Machinist," July 21, 1921

The machine is intended for attachment to a hand screw machine, so as to make the operation automatic. It is designed so that it is suitable for placing either at the turret end of the screw machine or at the head end, the latter arrangement being shown. The essential element of the machine is the large worm-driven disk, upon the sides of which cams can be mounted. The cams operate to press against hard steel rollers carried on the horizontal crosshead, causing this crosshead to slide back and forth on the finished guide at the center of the machine as the disk revolves. The motion is conveyed to the screw machine controls through a combination of levers. The motions start, reverse or stop the screw machine; and the turret is indexed, and cutting-off and forming tools operated, as desired. The machine, called the "Iron Man," can be set between two screw machines working on the same part, so as to control both of them at the same time.

Switch, Starting, Magnetic, A.C. Motor, G.E.

General Electric Co., Schenectady, N. Y.

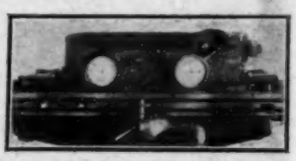
"American Machinist," July 14, 1921

This inclosed magnetic starting switch is for small alternating-current motors, and known as the C. R.-7005-A-2 switch. It is for use with motors of from 3 hp. and 110 volts up to 5 hp. and 220, 440, and 550 volts. The switch is suitable for use with momentary contact start and stop push-button stations, or snap switches, float switches, pressure governors and thermostats. The apparatus consists of an operating magnet, contactor, and protective plugs, all mounted on a sheet-steel base and inclosed in a case with a cover hinged at the top. All parts are easy of inspection, and renewal of vital parts is a simple matter, owing to their accessibility and design, it is said.

Dynamometer, Milling Machine, Poliakoff

Cincinnati Milling Machine Co., Oakley, Cincinnati, Ohio

"American Machinist," July 21, 1921

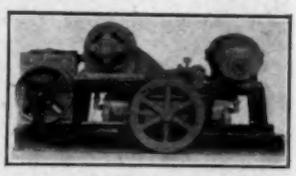


The dynamometer is used to determine the pressure exerted by a milling cutter at work. It is intended for mounting on a machine table, to hold the piece being cut. The pressure of the cutter on the work is shown by means of dials, one of which gives the vertical and the other the longitudinal thrust. Heavy springs are used to put initial loads on each hydraulic chamber, so that the dials will show loads in either direction. The dynamometer has the capacity to withstand longitudinal loads of 25,000 lb. in one direction and 4,000 lb. in the opposite direction, vertical downward pressures of 10,000 lb. and upward pressures of 7,000 pounds. The working surface of the table is 16 in. long by 10 in. wide, and is provided with three T-slots. The height of the working table is 8 in. The total size of the base is 35 x 14 inches.

Generator Set, Arc-Welding, Electric, Heavy-Duty, WD-9

General Electric Company, Schenectady, N. Y.

"American Machinist," July 21, 1921

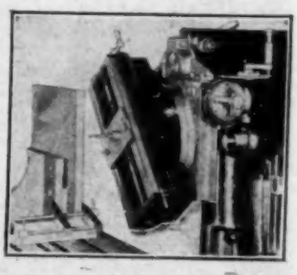


The equipment can be arranged to supply either one or two welding circuits. It consists of a 20-hp., 2-cylinder, opposed, Reliable Heer, Model 00 gas engine, a type WD-9 generator and welding panel, the whole mounted on a welded structural steel base. The net weight is 2,400 lb. for the single-operator equipment, and 3,200 lb. for the two-operator equipment. The engine is designed for continuous operation, and will run on kerosene, distillate, gasoline, or natural or artificial gas. The generator is driven by a silent chain running in oil, at a speed of 1,750 r.p.m.

Attachment, Drilling, Boring and Milling, Universal

Supreme Machine and Tool Co., 1738 St. Clair Ave., Cleveland, Ohio.

"American Machinist," July 21, 1921



The device is intended especially for jig boring; and it is said to eliminate the necessity of figuring and checking the angles on the work in the toolroom, of buttoning the jig and of removing the work. The attachment is arranged to fasten on the column and overarm of a milling machine. The boring spindle is driven from a main gear which is adapted to the spindle of the milling machine. The movements of the traveling spindle are two, being radially in a slide which, in turn, has a circular movement imparted by a series of worms and gears, so that any angle can be obtained. The attachment is self-contained and easily attached, and when in place it forms an integral part of the machine. It does not extend beyond the spindle of the milling machine any more than the ordinary drill chuck or boring toolholder.

Clip, paste on 3 x 5-in. cards and file as desired

foreign lands. He visited India, Java, China, Japan and the Hawaiian Islands.

WILLIAM R. NORCROSS, president of the American Molding Machine Co., of Terre Haute, Ind., has been appointed a member of the Board of Public Works of that city.

J. D. MOONEY, general manager of the Remy Electric Division of the General Motors Corporation has been promoted to vice-president in charge of operation. He will be located in the East. Mr. Mooney was formerly manager of the industrial bearing division of the Hyatt Roller Bearing Co.

I. J. REUTER has been appointed general manager of the Remy factory of the General Motors Corporation at Anderson, Ind.

W. H. HEARD, president of the Spramotor Company, London, Canada, has purchased the business and plant of the Aylmer Pump and Scale Co. at Aylmer, Ontario, and plans to carry on both factories .

PROF. WENTWORTH STEWART, president of the American Association of University Professors, addressed the Springfield (Mass.) Employment Managers' Association at its annual meeting on Dec. 6. Dr. E. C. Gilbert, of the Chapman Valve Co., was elected president; and L. A. Blanchard, of the National Equipment Co., was elected treasurer.

F. L. ROWLAND, assistant treasurer of the Gilbert & Barker Manufacturing Co., West Springfield, Mass., was recently elected executive secretary of the National Association of Office Managers at the recent meeting of that association in Buffalo, N. Y.

R. K. WINANS, of the advertising department of the Gilbert & Barker Manufacturing Co., West Springfield, Mass., has severed his connections with that company to become sales and service manager of the J. H. Bordeaux Co., advertising printers, etc., of Springfield, Mass.

E. J. CHARRON, of the general sales department of the Gilbert & Barker Manufacturing Co., West Springfield, Mass., has recently been transferred from the Montreal, Canada, to the South Bend, Ind., sales division.

H. L. GARDNER, of the general sales division of the Gilbert & Barker Manufacturing Co., West Springfield, Mass., has just returned from a three months' leave of absence spent traveling in England, France, Belgium and other countries of Europe. He will shortly take up his sales duties for the company in the California district.

Obituary

GUSTAV AKERLUND, inventor and consulting mechanical engineer, died in New York City on Dec. 13. Mr. Akerlund was president of the engineering firm of Akerlund & Semmes and was a prominent member of the American Society of Mechanical Engineers.

EDGAR W. SUMMERS, president of the Summers Steel Car Co., of Pittsburgh, Pa., died last week at Glenshaw, N. Y. He was sixty-three years old.

CHARLES C. HALE, president and general manager of Peck Brothers Company, New Haven, Conn., died at his home in that city on Dec. 7 after a short illness.

Book Reviews

The J. E. Aldred Lectures on Engineering Practice, 1920-21. Issued by the School of Engineering of the Johns Hopkins University, Baltimore, Md. Two hundred eighty-five 6 x 9-in pages, paper cover. Published by the Johns Hopkins Press, Baltimore, Md.

The nine lectures contained in the book comprise one part of a general plan carried on at Johns Hopkins to further and improve undergraduate instruction in the methods and problems of the practice of engineering. They deal with the practical phases of engineering problems, presupposing an elementary knowledge of theory.

The nine lectures are as follows: Electricity Supply Systems in Large Cities, by Philip Torchio, chief electrical engineer, New York Edison Co., New York City; Railway Signaling, by Azel Ames, engineer, Kerite Insulated Wire and Cable Co., New York City; Radiotelephony: Its Principles and Use, by John V. L. Hogan, manager, International Radio Telegraph Co., New York City; Subway Construction in New York City, by Robert Ridgway, engineer, Subway Construction, New York City; Municipal River Front Improvements, by George S. Webster, chief engineer, Western Electric Co., New York City; Modern Methods of Gas Manufacture, by Col. Frederick H. Wagner, Bartlett-Hayward Co., Baltimore; The Methods of Manufacturing a New Product, by Edwin Pugsley, Winchester Repeating Arms Co., New Haven; The Use of Automatic and Semi-Automatic Machines, by Ralph E. Flanders, manager, Jones & Lamson Co., Springfield, Vt.

Technologic Paper, No. 198. Bureau of Standards, Department of Commerce, sold by the Superintendent of Documents, Government Printing Office, Washington, D. C., price 5 cents.

A summary of some results of tensile tests of 368 specimens of manila rope, conducted by A. H. Stang, associate physicist, and L. R. Strickenberg, assistant mechanical engineer of the Bureau of Standards. The results of the tests are given in table and graphic form and a formula is arrived at for determining the average breaking load as a function of the diameter of the rope.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

An importing firm in Norway desires to purchase and secure an agency for the sale of hand tools, steel pulleys, all kinds of transmission appliances, and machine tools for iron and steel. Quotations should be given f.o.b. New York. Payment to the made through bank in Norway. Reference. No. 383.

A merchant in Italy desires to purchase or secure an agency for the sale of woodworking machinery and machinery repair parts. Correspondence should be in Italian. Reference No. 373.

The sole agency is desired of American motor car manufacturers, by a firm in New Zealand which uses a large number of cars in its own business. Reference No. 392.

Catalogs Wanted

The Engineering School of Drawing, 457 Main St., Springfield, Mass., would like to receive catalogs and diagrams of production machinery.

A gentleman in Barcelona, Spain, desires to be put in touch with American exporters of machinery supplies, such as cotton waste, leather belting, etc. He is in a position to sell such products in Spain and would like to take on a few representations of lines that are of high quality and reasonable price. Address J. G. Alonso, Fontanella 10, Barcelona, Spain.

Trade Catalogs

Recorder. Yarnall-Waring Co., Philadelphia, Pa. Circular describing recent development of a self-contained WRCO recorder.

Coffin Balancer Needle Valve. Coffin Valve Co., Neponset, Boston, Mass. Catalog describing the latest types of balanced needle valves.

Tips for Tool Hardener. Vanadium-Alloys Steel Co., Latrobe, Pa. Card for hardening room, contains thirty-seven tips or suggestions for the practical workman. Cards are sent gratis to the trade.

Hart Roller Bearings. Hart Roller Bearing Co., Orange, N. J. A well-made-up booklet entitled "Value versus Competition," which gives an intelligent presentation of the value of Hart staggered roller bearings of the radial and thrust type.

Whiting Cranes. Whiting Corporation, Harvey, Ill. Beautifully illustrated catalog, eighty 6 x 9-in. pages, No. 158, describing a full line of electric cranes, bucket cranes, jib cranes, lifting attachments and railway specialties.

Hobbing Cutters. Simmonds-Method Hob Co., Philadelphia, Pa. Catalog describing construction and use of hobbing cutters with generated teeth. Tables of size and specifications are included.

"Wonder Chuck." The Callis Company, Clinton, Ohio. Bulletin "A," illustrating and describing the latest model "Wonder" chuck now on the market.

Quality Tools. The Callis Company, Clinton, Ohio. General catalog No. 10 describing, with illustrations a line of drill chuck arbors lathe bushings and centers, sockets, chucks and tapers.

Chuck Arbors. The Callis Company, Clinton, Ohio. Bulletin "E" describing a line of Collis drill chuck arbors. Tables of sizes, specifications and prices are included.

Sebastian Lathes. The Sebastian Lathe Co., Cincinnati, Ohio. Catalog No. 26 describing a line of quick change lathes and attachments. Each model is fully specified and individual parts, as well as the whole machine, are illustrated.

Parker Grinding, Drilling and Turning Machine. Ex-Cell-O Tool and Manufacturing Co., Detroit, Mich. A four-page circular describing a new machine for use in a garage machine shop. The machine is illustrated in each of the operations which it performs and all details are clearly given.

Connecticut Universal Grinding Machine. Middlesex Machine Co., and New Haven Sherardizing Co., Hartford, Conn. Catalog describing the No. 3 machine equipped for cylinder grinding. Parts and attachments are also described and illustrated.

Lead Base Babbitt Metal. Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. Folder No. 4474, announcing the placing on the market of lead base babbitt metal. Many valuable hints are given in the text which covers design and machinery of bearings and shells, overheating, tinning pipe and malleable iron, and cleaning solutions and materials.

Forthcoming Meetings

American Engineering Council: Annual meeting Jan. 5 and 6, Washington, D. C. L. W. Wallace is secretary.

Society of Automotive Engineers: Annual meeting Jan. 11 to 13, Engineering Societies Building, New York City. C. F. Clarkson, secretary.

American Society of Civil Engineers: Annual meeting Jan. 18 and 19, Engineering Societies Building, New York City. Charles W. Hunt, secretary.

United Engineering Societies: Annual meeting Jan. 26, Engineering Societies Building, New York City. A. D. Flinn, secretary.

American Institute of Electrical Engineers: Mid-winter meeting Feb. 15, 16 and 17. Engineering Societies Building, New York City, F. L. Hutchinson, secretary.

American Institute of Mining and Metallurgical Engineers: Annual meeting Feb. 20 to 24, Engineering Societies Building, New York City. B. Staughton, secretary.

Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Trolley System, Overhead, "Short-Turn"

The Whiting Corporation, Harvey, Ill.

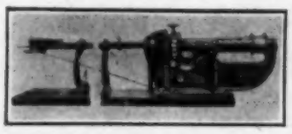
"American Machinist," July 21, 1921

This overhead trolley system is intended for the carrying of chain blocks or hoists. The track itself consists of two parallel channels spaced 2½ in. between the flanges and held in place by clamps. The track is designed to carry loads with supports at only the splices, corners and switch points. The apparatus consists of standard channels, turns, 90-deg. right or left switches, and universal switches. The illustration shows a view looking up at the track equipped with a series of universal switches. Each corner and switch connection is interchangeable. All the corners and switches have a track curvature of 18 in. The hoist is carried on either 2-, 4-, or 8-wheel trolleys, having ball-bearing wheels and guide rollers. The wheels of the trolley run on the level tops of the channels, and its design permits it to swing in the 18-in. radius curves.

Straightening and Cutting Machine, Wire, Automatic, "Bevico"

Bevington Metal Stamping Co., 1545 E. 18th St., Cleveland, Ohio

"American Machinist," July 21, 1921



The machine handles round wire directly from the coil. It is driven by a single belt. Norma ball bearings are used for the arbor, and interchangeable bronze bearings for the other parts. An operator can attend to several machines at once. The feed rolls and cutting dies are made of heat-treated tool steel. The straightening dies are either gray iron, wood, babbitt or brass, depending upon the kind of wire to be handled. The Model B machine handles wire from No. 20 W & M gage to 5/32 in. in diameter, cutting it automatically into lengths from 6 in. to 4 ft. The machine can be furnished to cut any length of wire, however, and can be built to handle wire ¾ in. in diameter. It requires ¾ hp. to operate it, and it weighs 250 lb.

Hoist, "Turbinair"

Sullivan Machinery Co., 122 S. Michigan Ave., Chicago, Ill.

"American Machinist," July 21, 1921

The device, known as the "Turbinair" hoist, is intended for general hoisting or hauling work, being so compact that it may be mounted in a very small space. It is stated to be very powerful, considering its size, having a capacity of 1,500 lb. dead load lifted at 100 ft. per minute, using an air pressure of 80 lb. per square inch. The hoist consists primarily of a cylindrical drum, mounted on a steel frame and completely enclosing the operating mechanism, consisting of a motor and reduction gearing. There are two cylindrical rotors, each provided with right- and left-hand helical flutes converging to a spur tooth in the center. The rotors mesh together, and are caused to revolve by the pressure of the incoming air. The hoist is provided with a friction clutch and brake.

"Protractagraph," Drafting Instrument

Turner Devices, Inc., 5 S. Newstead Ave., St. Louis, Mo.

"American Machinist," July 21, 1921

The instrument is intended to take the place of the usual drafting tools, such as triangles, scales and protractors; and it is said to be a combination of all of these tools, so that the draftsman has but one instrument to handle when making a drawing. The device is intended for use with any parallel-ruler attachment on a drawing board, being shown clamped to the straight edge. It consists primarily of a plate formed at its lower end into a semi-circular protractor graduated to ½ deg., the working arc being 180 deg. Various scales and a transparent amber inking blade, all of which are easily detachable, are furnished with the machine. A knob on the axis of the device is used to revolve the scale, and a screw is provided for locking it in position.

Under-worker, Floor-Level, Automobile

Manley Manufacturing Co., York, Pa.

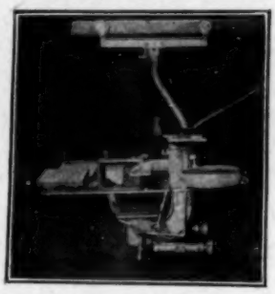
"American Machinist," July 21, 1921

The device is intended for elevating either the back or the front end of an automobile, so as to give access to the under parts of the chassis, and to eliminate the necessity for a pit in the floor. The mechanic can work in a sitting position and with the job in front of him, varying the height of the machine to suit his convenience. The position permits light to reach the parts. A double crank on one of the uprights is used to rotate the top horizontal member of the frame, winding around the member a heavy chain attached to the axle of the automobile and pulling the machine up the incline. The tracks can easily be removed from the under-worker so that the device can be put out of the way, requiring but little space. The under-worker can quickly be moved wherever desired, so as to work on a car in any part of the shop, only one man being required to handle it.

Molding Machine, Suspended, Howe-Teetor, No. 9

R. J. Teetor Co., Muskegon, Mich.

"American Machinist," July 21, 1921

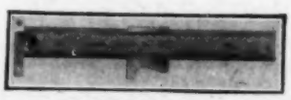


The illustration shows the machine suspended, the trolley wheels running on roller bearings, so that the machine can be moved along as the row of molds is made. The device can be swung about a vertical axis. The machine can be supported from the floor by means of two legs operated by compressed air. When it is desired to move the machine, the air is released and the feet drawn up by means of springs. The legs may be turned into a horizontal position, as shown, giving a clearance of 19 in. The squeezer platen is a malleable-iron casting mounted on a 2-in. shaft pivoted between centers, and has a vertical adjustment of 6 in. The cylinder and column are cast in one piece. The side bench at the left of the machine is rigidly attached to the main casting. At the right is a swinging riddle shelf that may be swung over the mold into position for riddling sand onto the pattern.

Rule, Caliper, Machinists'

Union Tool Company, Orange, Mass.

"American Machinist," July 21, 1921



The slide is held in position on the rule by the tension of an elliptic spring and may easily be moved in either direction by the pressure of the thumb. The slide is ground to exactly 1 in. in length, and beveled edges are provided at each end to facilitate reading the scale. When reading from the outer end, allowance is made in the number of full inches for the length of the slide, the fraction indicated being the same at each end.

Boxes, Carbonizing and Case-Hardening

Pioneer Alloy Products Co., Cleveland, Ohio.

"American Machinist," July 21, 1921.

The boxes are cast in any size or shape desired. However, square and rectangular boxes are not used, because of the fact that they are more apt to crack. The small round box shown on the right of the illustration is 13¾ in. inside diameter, 20 in. overall in height, has a 10-in. opening at the top, and weighs with the cover 108 lb. The long box of cylindrical shape, shown on the left, is intended for the heat-treating of camshafts. It is 34½ in. long and 12½ in. wide on the inside, the height overall being 12⅞ in. The weight with the cover is 280 lb. The material from which the boxes are made is an alloy steel containing sufficient chromium to make it practically non-oxidizing. The merits of the box and its long life are said to be due not only to the alloy used but to the shape employed.

Clip, paste on 3 x 5-in. cards and file as desired

NEW *and* ENLARGED

Machine Tools and Machinery Wanted

Machine-tool wants published without charge

N. J., Newark—The Kreuter & Co., Inc., 571 18th St., manufacturer of mechanics tools—two power presses and milling machinery.

N. J., Trenton—E. R. Huddy, 755 Cass St.—sheet metal machinery for proposed plant on Lexington St.

N. Y., New York—The Moritaini Co., 24 Stone St.—three vertical boring mills of 6, 7 and 8 ft. diameter each.

N. Y., New York—The Patent Scaffolding Co., 647 West 50th St.,—combination punch and shears to cut 2½ x ⅝ bars and 2½ x 2½ x ⅝ angles.

Pa., Philadephia—L. F. Seyferts Sons, Inc., 437-41 North 3rd St., one No. 00, one No. 0 and one No. 2, Brown & Sharpe automatic; one P-3 Ferracute press; one style 31 or 32 Lucas boring mill; two No. 74½ straight side Bliss geared presses and one No. 2-A Warner & Swasey screw machine.

Ky., Poor Fork—Fields Bros. Motor Co., Inc.—complete equipment for automobile repair shop, including lathe, etc.

N. C., Greensboro—The Newman Machine Co., Jackson St. along tracks of Southern Ry., G. F. Newman, Pres.—Doig or Morgan nailing machines.

Va., Richmond—Hackley Morrison Co., 16½ North 9th St.—Berlin or Yates planer, 6 x 15, high speed, thin knives; circular resaw; 20 brick dryer cars, double or single.

Ill., Chicago—The Chicago, Milwaukee & St. Paul Ry., 80 East Jackson Blvd., G. H. Walder, Purch. Agt.—one No. 2 Champion tool grinder.

Ill., Chicago — LaSalle Co., 30 North LaSalle St., Room 706—drawing press, double action toggle with 14 in. to 16 in. stroke and 20 in. blank space.

Ill., Chicago—A. D. White Mchy. Co., 108 North Jefferson St. — one straight sided geared press, 10 in. stroke, light pattern, five to ten thousand pounds.

Ill., Peoria—The Stuber & Kuck Co., 2800 South Adams St. (tin ware)—1 bench lathe, screw cutting about 9 in. swing by 3 ft. bed.

Mich., Detroit—The Hudson Motor Car Co., 12601 East Jefferson St., I. R. Halladay, Purch. Agt.—

One No. 30 Natco multi driller having 22 x 38 in. rectangular head, arranged with patented independent change of speed to each individual drill, arranged for 34, but equipped with 3 1¼ in. spindles No. 2 Morse Taper, 21 1 in. spindles No. 2 Morse Taper, 2 ⅞ in. spindles No. 1 Morse Taper with lubricating pump. Complete with all standard equipment.

One No. 30 Nacto multi driller having 22 x 38 in. rectangular head arranged with patented independent change of speed to each individual drill arranged for 34, but equipped with 2 1¼ in. spindles No. 2 Morse Taper, 20 1 in. spindles No. 2 Morse Taper, with lubricating pump. Complete with all standard equipment.

One No. 3 single spindle LaPointe Broach, complete with all standard equipment.

One Fisher oil groover "Standard," complete with countershaft and all standard equipment,

One No. 18 Globe tumbling barrel.

Five 1½ in. Cone automatic complete with countershaft and all standard equipment. 3-3 Sets 1 1/16 in. Round Collets, 2-2 Sets 1⅛ in. Round Collets.

One 1 in. Cone automatic complete with countershaft and all standard equipment. 1-1 Set 1/16 in. Hex Collects. 1-1 Set ⅞ in. round Collets.

One 3½ in. Cone automatic complete with countershaft and all standard equipment. 1-1 Set 1½ in. Hex Collets, 1-1 Set 2 in. round Collets, 1-1 Set 2½ in. round Collets.

One ⅞ in. "B" Cleveland plain automatic complete with countershaft and all standard equipment.

One 021 Williams & White or substitute bulldozer.

Two 22 in. Aurora or substitute drills sliding head power feed to spindle.

Two No. 2 Warner & Swasey turret screw machine with geared friction head, automatic chuckless bar feed, power feed to turret, hand feed to cut off, complete with countershaft and all standard equipment.

One No. 4 Warner & Swasey turret screw machine with geared friction head, automatic chuckless bar feed, power feed to turret, hand feed to cut off, complete with countershaft and all standard equipment.

Two No. 6 Warner & Swasey turret screw machines with geared friction head, automatic chuckless bar feed, power feed to turret, hand feed to cut off, complete with countershaft and all standard equipment.

One No. 103 rivet internal automatic grinder, complete with countershaft and all standard equipment.

One No. 6 Blanchard vertical high power surface grinder with direct motor drive, including one 20 hp. G. & E. motor for spindle and one 2 hp. G. & E. motor for base. Motor current 220 volt, 60 cycle, 3 phase. Chuck current 220 volt.

One 3 ft. Pratt & Whitney vertical surface grinder or 4 ft. Springfield brandes vertical surface grinder, motor or belt driven, 220 volt, A.C., 60 cycle, 3 phase.

Two No. 2-B "Milwaukee" horizontal plain milling machine, complete with all standard equipment.

One No. 3-B "Milwaukee" horizontal plain miling machine, complete with all standard equipment.

Three No. 6 Toledo or Whitney hand miller, complete with countershaft and all standard equipment.

One No. 2 Bilton gear automatic miller.

Three BW-1 single spindle edlund or sipp sensitive drill press, 8 in. overhang with water pump, pan and piping.

Four BW-2 two spindle high speed ball bearing sensitive drill with 8 in. overhang with water pump, pan and piping.

Mich., Kalamazoo — The Reed Fdry. & Machine Co., Fulford St.—machine shop equipment for finishing steel castings for tractor parts.

O., Cincinnati—The Economy Mchy. Co., 428 East Pearl St., J. Flynn, Purch. Age.—one 6 ft. boring mill and one 14 in. lathe, 10 ft. between centers.

O., Cincinnati—The Eastern Mchy. Co., 408 East Pearl St., R. Smith, Purch Agt.—one 60 in. boring mill, 2 heads on rail; one 48 x 48 in. open side planer, 10 ft. table, 1 head on cross rail and 1 head on side; one 60 in. locomotive driving wheel lathe; one 3½ in. Gridley automatic lathe, single spindle.

O., Cincinnati—The Jones Machine Tool Co., 435 East Pearl St., H. C. Jones, Purch. Agt.—one 10 ft. bending rolls for 1 in. plate; one angle and slitting shear for 6 in. x 6 in. x 1 in. angles; one 10 ft. power square shear for 1/16 in. plate; all to be motor or belt driven.

O., Cincinnati—The E. A. Kinsey Co., 331-5 4th St., W., J. O. McManus, Purch. Agt.—one planer type milling machine, similar to Ingersoll or Newton, about 4 ft. wide, 4 ft. high, with 16 ft. table and one vertical head on rail, belt or motor driven (used).

O., Cincinnati — Rittenhouse & Deremo Auto Service Co., 1212 Race St., C. Rittenhouse, Purch. Agt.—equipment for garage, including one ½ ton chain block, one Red Devil jack and one emery wheel.

O., Cleveland—The Simmons Mfg. Co., 3405 Perkins Ave., J. W. Simmons, Purch. Agt.—one 8 in. or 10 in. vertical grinder with rotary magnetic chuck (used); one floor computing scale.

O., Cleveland—Strong, Carlisle & Hammond, 1394 West 3rd St.—No. 6 Bliss geared double crank press, 8 in. stroke, No. 79½ Bliss straight sided geared press, 8-12 in. stroke, three No. 76½ Bliss geared straight sided presses, 8 in. stroke, two No. 77½ Bliss geared straight sided presses, 8 in. stroke, No. 21 Bliss geared inclinable pres 3-4 in. stroke No. 14½ Toledo geared press., 3-4 in. stroke.

O., Cleveland—The White Co., St. Clair and East 79th Sts.—one motor driven grinding stand, 18 in. x 8 ft. lathe, arbor press and miscellaneous tools for service station.

O., Cleveland—The Y. M. C. A. Manual Training School, Prospect and East 22nd Sts., A. Sperry—one 9 in. bench lathe.

Wis., Green Lake—Green Lake County, D. C. Williams, Highway Comr.—lathe, drill press, grinder, electric motors, to be used in repairing road machinery.

Wis., Milwaukee—C. I. Banker Iron Wks., 213 Reed St., P. Pinter, Purch. Agt.—medium size lathe.

Wis., Milwaukee—F. Toepfer & Son, 460 Natl. Ave. (auto repairs), F. Toepfer, Purch. Agt.—lathe, suitable for repair work.

Wis., Wauwatosa—Whipp & Goebel, 67 Vine St., manufacturers of sheet metal, J. Goebel, Purch. Agt.—8 in. brake, square shear and beader.

Kan., Kansas City—The Kaw Boiler Wks. Co., 1st and Walker Sts., C. T. Moyle, Purch. Agt.—one 32 in. lathe, 8 ft. between centers, one 12 in. lathe 6 ft. between centers, direct connected for 3 phase, 60 cycle, 440 volt, a.c. current.

N. Y., Buffalo—The Buffalo Hardwood Lumber Co., 940 Seneca St., T. H. Wall, Purch. Agt.—Ideal Stencil cutting machine to stencil lumber. Letter size to be ⅝ or 1 in.

Pa., Philadelphia — L. A. Esler, 1016 Callowhill St.—manglers, washing machines, ironers, etc., for laundry.

Pa., Philadelphia—G. F. Morgenthaler & Bro., Phillips and Jackson Sts., G. F. Morgenthaler, Pres.—general ice manufacturing machinery.

Ky., Somerset — The Continental Rock Asphalt Co., Inc., W. A. White, Pres.—one 24 x 12 to 20 ft. lathe, hollow equipment; one 36 x 16 to 18 ft. lathe with hollow spindle; one 50 to 60 in. radial drill; Cincinnati No. 3 milling machine or other machine of equal size; shaper, medium size; power hacksaw; other miscellaneous machine tools, etc. (used if in good condition); also 1½ miles 90 lb. rail, frogs, spikes and switch equipment for two sidings.

The Weekly Price Guide

This Week's Market

The new Pittsburgh basing card of Dec. 15 quotes increased discounts on wrought steel pipe, all sizes, averaging 3 per cent on black and 2½ per cent on galvanized. This makes a reduction of about $5 per ton and constitutes the first change in price since Sept. 16. The change at the mill has been immediately reflected in the New York warehouse quotations.

Cold finished shafting is quoted at $3.55, and flats, squares, hexagons, etc. at $4.05 in both New York and Chicago warehouses—making a reduction of 33c. in New York and 28@30c. per lb. in Chicago. Tin has advanced 1½., zinc ½c., solder ½c. and babbitt metal 2½c.; while tin plates have declined ½c. per lb. in New York warehouses. Cleveland reports advances ranging from ½c. to ¾c. in old metals and ½c.@2½c. per lb. in babbitt metal, best grade.

IRON AND STEEL

PIG IRON — Per gross ton — Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$22.50
Northern Basic	22.02
Southern Ohio No. 2	23.52
NEW YORK—Tidewater Delivery	
Southern No. 2 (Silicon 2.25 to 2.75)	28.50
BIRMINGHAM	
No. 2 Foundry	18.00
PHILADELPHIA	
Eastern Pa., No. 2x, 2.25-2.75 sil	23.26
Virginia No. 2	28.74
Basic	20 75
Grey Forge	22.50
CHICAGO	
No. 2 Foundry local	21.70
No. 2 Foundry, Southern, sil 2.25@2.75	24.66
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	22.46
Basic	20.96
Bessemer	21.96

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	New York	Cleveland	Chicago
No. 10	2.25	3.28	3.10	3.38
No. 12	2.30	3.33	3.15	3.43
No. 14	2.35	3.38	3.20	3.48
No. 16	2.55	3.48	3.30	3.58
Black				
Nos. 17 and 21.	2.85	3.80	3.55	3.95
Nos. 22 and 24.	2.90	3.85	3.60	4.00
Nos. 25 and 26.	2.95	3.90	3.65	4.05
No. 28	3.00	4.00	3.75	4.15
Galvanized				
Nos. 10 and 11.	3.00	4.00	3.75	4.15
Nos. 12 and 14.	3.10	4.10	3.85	4.25
Nos. 17 and 21.	3.40	4.40	4.15	4.55
Nos. 22 and 24.	3.55	4.55	4.30	4.70
No. 26	3.70	4.70	4.55	4.85
No. 28	4.00	5.00	4.75	5.15

WROUGHT PIPE—The following discounts are to jobbers for carload lots on the latest Pittsburgh basing card:

Steel BUTT WELD Inches	Black	Galv.	Iron BUTT WELD Inches	Black	Galv.
1 to 3	71	58½	⅜ to 1¼	44½	29½
LAP WELD					
2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 4	42½	29½
7 to 8	65	51½	4½ to 6	42½	29½
9 to 12	64	50½	7 to 12	40½	27½
BUTT WELD, EXTRA STRONG, PLAIN ENDS					
1 to 1½	69	57½	1 to 1½	44½	30½
2 to 3	70	58½			
LAP WELD, EXTRA STRONG, PLAIN ENDS					
2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

Malleable fittings. Classes B and C, Banded, from New York stock sell at net list. Cast iron, standard sizes, 20–5% off.

WROUGHT PIPE—Warehouse discounts as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	66%	53%	60½%	47½%	60%	46%
2½ to 6 in. steel lap welded	61%	47%	58½%	44½%	57%	43%

Malleable fittings. Classes B and C, Banded, from New York stock sell at list less 5%. Cast iron, standard sizes, 32% off.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	5.00	6.00	4.28
Spring steel (light) (base)	6.00	6.00	3.68
Coppered Bessemer rods (base)	8.00	8.00	6.03
Hoop steel	3.53	3.14	3.28
Cold rolled strip steel	6.25	8.25	6.75
Floor plates	4.85	2.64@2.80	5.23
Cold finished shafting or screw	3.55	3.50	3.55
Cold finished flats, squares	4.05	4.00	4.05
Structural shapes (base)	2.78	2.64	2.88
Soft steel bars (base)	2.68	2.54	2.78
Soft steel bar shapes (base)	2.68	2.54	2.78
Soft steel bands (base)	3.28	....	3.48
Tank plates (base)	2.78	2.92½	2.88
Bar iron (2.00@2.10 at mill)	2.68	3.52	2.78
Drill rod (from list)	55@60%	55%	50%
Electric welding wire:			
⅜	8.50		12@13
¼	7.15		11@12
5/32 to ⅛	6.75		10@11

METALS

Current Prices in Cents Per Pound

	New York	Cleveland	Chicago
Copper, electrolytic (up to carlots), New York			14.37½
Tin, 5-ton lots, New York			34.00
Lead (up to carlots), St. Louis, 4.60; New York			5.00
Zinc (up to carlots), St. Louis, 4.97½; New York			5.62½
Aluminum, 98 to 99% ingots, 1-15 ton lots	25.20	20.00	18.00
Antimony (Chinese), ton spot	5.50	6.50	6.75
Copper sheets, base	21.25	22.00	23.00
Copper wire (carlots)	16.50	17.00	16.25
Copper bars (ton lots)	19.75	24.00	19.50
Copper tubing (100-lb. lots)	21.25	24.00	23.00
Brass sheets (100-lb. lots)	16.75	17.00	18.75
Brass tubing (100-lb. lots)	18.50	19.50	20.50
Brass rods (1,000-lb. lots)	14.75	16.00	15.75
Zinc sheets (casks), (8% dis. carlots)	10.50	10.15	15.75
Nickel (ingot and shot), Bayonne, N. J.	41.00	.....	.....
Nickel (electrolytic), Bayonne, N. J.	44.00	.....	.....
Solder (½ and ½), (case lots)	21.00	21.50@23.50	19.25
Babbitt metal (best grade)	24.62½	43.75	36.00
Babbitt metal (commercial)	9.87½	13.50	9.00

—Shop Materials and Supplies

MONEL METAL—Base price in cents per lb., f.o.b. Bayonne, N.J.:

Shot	35.00	Hot rolled machined rods (base)	53.00
Blocks	35.00	Hot rolled rods (base)	42.00
Ingots	38.00	Cold drawn rods (base)	56.00
Sheet bars	40.00	Hot rolled sheets (base)	55.00

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel ingots	45
Malleable nickel sheet bars	47
Hot rolled rods, Grades "A" and "C" (base)	60
Cold drawn rods, Grades "A" and "C" (base)	72
Copper nickel ingots	37
Hot rolled copper nickel rods (base)	45
Manganese nickel hot rolled (base) rods "D"—low manganese	64
Manganese nickel hot rolled (base) rods "D"—high manganese	67

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	11.25	11.50	11.00
Copper, heavy, and wire	11.00	11.00	10.00
Copper, light, and bottoms	9.50	9.00	8.75
Lead, heavy	4.00	3.75	3.50
Lead, tea	3.00	2.75	3.00
Brass, heavy	7.00	6.50	8.50
Brass, light	5.00	4.50	5.00
No. 1 yellow brass turnings	5.75	5.50	5.75
Zinc	3.00	2.50	2.75

TIN PLATES—American Charcoal Plates—Bright—Cents per lb

		New York	Cleveland	Chicago
"AAA" Charcoal Melyn Grade:				
IC,	20x28, 112 sheets	20.00	19.00	18.50
IX,	20x28, 112 sheets	22.50	21.50	20.90
"A" Charcoal Allaways Grade:				
IC,	20x28, 112 sheets	17.00	16.75	17.00
IX,	20x28, 112 sheets	20.00	19.50	19.60
Coke Plates, Bright				
Prime, 20x28 in.:				
100-lb.,	112 sheets	12.50	12.00	14.50
IC,	112 sheets	12.80	12.30	14.80
Terne Plate				
Small lots, 8-lb. Coating:				
100-lb.,	14x20	7.00	5.60	7.25
IC,	14x20	7.25	5.85	7.40

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb	$0.07½@$0.10	$0.12	$0.12
Cotton waste, mixed, per lb	.055@.09	.09	.10
Wiping cloths per M., 13¼x13¼	.....	50.00	55.00
Wiping cloths per M., 13¼x20½	.....	55.00	65.00
Sal soda, 100 lbs	2.10	3.00	2.65
Roll sulphur, 2-bbl. lots per 100 lb	2.55	3.25	3.50
Linseed oil, per gal., 5 bbl. lots	.72	.77	.74
White lead, dry or in oil	100 lb. kegs.	New York, 12.25	
Red lead, dry	100 lb. kegs.	New York, 12.25	
Red lead, in oil	100 lb. kegs.	New York, 13.75	
Fire clay, per 75 lb. bag		.80	1.00
Coke, prompt furnace, Connellsville	per ton	$3.00	
Coke, prompt foundry, Connellsville	per ton	3.75@4.75	

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in.	—50%	—60%	60-10-10%
1⅛ and 1¼x3 in. up to 12 in.	—40%	-60-10-10%	-60-10%
With cold punched sq. nuts	—30%	.....	....
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	—40%	.....	$4.00 off
Button head bolts, with hex. nuts	—20%	$3.90 net	.....
Hex. head and hex. nut bolts	—20%	.....	-65-5%
Lag screws, coach screws	—50–10%	.....	—60%
Carriage bolts, all sizes up to 1 in. x 30 in.	—45%	—50-10-10%	50–5%
Bolt ends, with hot pressed nuts	—50%	.....	—55%
Tap bolts, hex. heads	—20%	.....	.....
Semi-finished nuts all sizes	—70%	—75%	—80%
Case-hardened nuts	—60%	.....	.....
Washers, cast iron, ⅜ in., per 100 lb. Off list	$5.00	$5.50	$3.50 net
Washers, cast iron, ½ in. per 100 lb. Off list	4.25	3.75	3.50 net
Washers, round plate, per 100 lb. Off list	3.00	....	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	2.00	3.00	4.00
Nuts, hot pressed, hex., per 100 lb. Off list	2.00	3.00	4.00
Nuts, cold punched, sq., per 100 lb. Off list	1.50	3.00	4.00
Nuts, cold punched, hex., per 100 lb. Off list	1.50	3.00	4.00
Rivets:			
Rivets, $\frac{7}{16}$ in. dia. and smaller	-50-10%	60-10-10%	-65-5%
Rivets, tinned	-50-10%	60-10-10%	4½c. net
Button heads ¾-in., ⅞-in., 1x2 in. to 5 in., per 100 lb (net)	$3.50	3.50	3.43
Cone heads, ditto (net)	3.60	3.60	3.53
1⅛ to 1⅞-in. long, all diameters, *EXTRA* per 100 lb	0.25	.....	0.15
⅝ in. diameter *EXTRA*	0.15	.....	0.15
½ in. diameter *EXTRA*	0.50	.....	0.50
1 in. long, and shorter *EXTRA*	0.50	.....	0.50
Longer than 5 in. *EXTRA*	0.25	.....	0.25
Less than 200 lb *EXTRA*	0.50	.....	0.50
Countersunk heads *EXTRA*	0.35	.....	$4.03 base
Copper rivets	—60–5%	—40-10%	—50-10%
Copper burs	—40%	—15%	—10%
Lard oil, pure, (50 gal. bbl.) per gal.	$0.90	$0.85	$0.90
Lard cutting oil (50 gal. bbl.) per gal.	0.60	0.50	0.55
Machine oil, lubricating, per gal.	0.45	0.35	.....
Belting—Present discounts from list in fair quantities (½ doz. rolls)			
Leather:			
Light grade	50–5%	50–5%	50–5%
Medium grade	45%	40–10–2½%	.....
Heavy grade	40%	40%	.....
Rubber and duck:			
First grade	50–10%	50–10%	.....
Second grade	60–5%	60–5%	60–5%
Abrasive materials—In sheets 9x11 in.:			
No. 1 grade, per ream of 480 sheets,			
Flint paper	List $9.00 less 20-10-5%	50–10–5%'-20-10%	
Emery paper	List 11.00 less 20%	$11.00 net –20%	
Emery cloth	List 32.75 less 10%	32.75 net –10%	
Flint cloth, regular weight, width 3½ in., No. 1 grade, per 50 yd. roll, $4.50 net	..... list+10%		
Emery discs, 6 in. dia., No. 1 grade, per 100.			
Paper	List $1.65 less 20%	.....	–10%
Cloth	List $3.55 less 10%	.....	–10%

S. C., Newberry—The Chamber of Commerce, C. P. McDaniel, Secy.—complete machinery for pickling plant, also supplies, including bottles, etc.

Tenn., Nashville—The Nashville Box Co., 5th and Crutcher Sts., C. V. Hicks, Secy.—lock corner machine for boxes to 18 x 18 in.; assembling machine; continuous feeder joiner machine (wooden boxes); screw driving machine.

W. Va., Salem—The Salem Flint Glass Co., H. L. Bee, Secy. and Treas.—single and double crimpers, pipes, snaps, fitters, fan blowers, etc., for glass plant.

W. Va., Wheeling—C. L. Hills, 403 Natl. Bank Bldg., manufacturer of ice—refrigerating machine, 30 to 50 ton capacity, prefer horizontal designed for belt drive (used), also ice tank up to 50 ton capacity.

Ill., Chicago—The Amer. Hide & Leather Co., 1320 Elston St.—tanning machinery for proposed plant at 658 Commerce St., Milwaukee, Wis.

Mich., Ironwood—J. F. Gluck—air compressor and gasoline pumps for garage.

Mich., Marquette—The Marquette Model Wks., L. J. Genette, Purch. Agt.—woodworking machinery for the manufacture of wood patterns.

O., Cincinnati — Clifton-Pratt Co., 1224 West 8th St., A. E. Clifton, Purch. Agt.—one triplex, belt driven, 4 plunger hydraulic pump, 5,000 lb. pressure, also four 24 x 48 in. tumblers for foundry, belt driven.

O., Cincinnati — The Jung Brewing Co., 2014 Freeman Ave., A. Tiebermann, Purch. Agt.—converting brewery into ice plant—additional ice making machinery.

O., Cincinnati—I. Oscherwitz & Sons Co., 569 West 6th St., M. B. Oscherwitz, Purch. Agt.—refrigerating plant, 25 ton capacity; 25 hp. horizontal boiler, 100 lb. pressure; sausage machinery including kettles, etc.

O., Cleveland—The Newcomb Galvanizing & Supply Co., 1714 Columbus Rd.—bench polishers.

O., Columbus—The Dept. Pub. Wks., Oak and 9th Sts., H. M. Seabright, Engr.—one coal and ash conveyor for institution for epelliptics at Gallipolis. $8,000.

Wis., Beaver Dam — Bartelt Bros.—ice making machinery mechanical freezers and electric motors.

Wis., Elcho—C. W. Fish Lumber Co.—woodworking machinery for proposed planing mill at Antigo.

Wis., Fond du Lac — The Combination Door Co., 180 Ruggles St., manufacturer of woodwork and doors, L. C. Schmidt, Purch. Agt.—hollow mortiser, medium size planer, one sander, electric motor.

Wis., Green Bay—The Fort Howard Paper Co., A. Cofrin, Mgr.—special paper machinery.

Wis., Green Bay—The Investment Corp. of Green Bay, 113 West Walnut St., L. M. Hansen, Pres.—two ice machines for proposed cold storage plant on North Bway.

Wis., Madison—The University of Wisconsin, M. E. McCaffery, Secy.—printing machines and presses, for printing university publications.

Wis., Manitowoc—The city, c/o A. H. Zander, Clk., will take bids about Feb. 1 for machinery and equipment for gravel pit, including loader, gravel conveyors, (buckets) and 3½-ton truck for gravel.

Wis., Manitowoc—F. Sterzik, Pres. of the Natl. Toy & Tinsel Co., 16th and Hamilton Sts.—woodworking machinery for proposed furniture factory at Chippewa Falls.

Wis., Markesan—Folsom-Miller Co.—special machinery for the manufacture of washing machines.

Wis., Milwaukee—E. Buschach, 1682 11th St.—belt sander to carry 6 in. belt.

Wis. Milwaukee—H. R. Erdmann, 109 Nock St—one belt sander.

Wis., Milwaukee — J. Leenhouts, 1614 Lloyd St.—combination planer, rip saw and boring machine.

Wis., Milwaukee—The Milwaukee Oldsmobile Co., 528 Bway., C. Goersch, Purch. Agt.—chain hoist or monorail suitable for machine shop use.

Wis., Milwaukee—The Oswald Jaeger Co., 914 Central Ave., manufacturer of food products—ice machine.

Wis., Milwaukee—J. A. Starck, 1167 39th St. (woodworker)—30 or 32 in. band saw, planer up to 18 in., hollow chisel mortiser.

Wis., Racine—The Webster Electric Co., De Koven Ave. and Clark St., K. H. Studt, Purch. Agt.—crucible furnace for lead on cyanide hardening, crucible size 12 in. x 12 in.

Wis., Rhinelander—The S. Miller Fruit Co.—artificial ice making machinery.

Wis., Sheyboygan—The Wisconsin Mirror Plate Co., 10th and Maryland Sts.—special machinery for proposed plant.

Wis., Sparta—E. Genseline—belt driven grain grinding machinery.

Wis., Wisconsin Rapids—The Consolidated Water Power Co., J. Schnable, Purch. Agt.—elevator conveyor and buckets for handling shredded pulp, also other equipment for pulp storage plant.

Wis., Wisconsin Rapids—Mott & Wood Co., Wisconsin Rapids, dairy products, R. J. Mott, Purch. Agt.—belt driven ripeners, pasteurizers and churns

Mo., Carterville—The Carterville Fruit & Tomato Cannery, c/o F. L. Gass, Secy.—canning machinery and cookers.

Mo., St. Louis—L. A. Paule, Jr., 1125 Pierce Bldg., manufacturer of preserves, jellies, etc.—equipment for preserving plant including apple pulper, two pickle vats, about 700 to 800 gal. or 1,000 gal.

Cal., Sacramento—A. B. Atkinson, 3256 5th Ave.—equipment for proposed ice plant on South East 13th and S Sts.

Cal., Sacramento—The Sacramento Brick Co., Front and N Sts.—machinery and equipment for the manufacture of brick and roofing materials.

Cal., San Anselmo—B. B. Jones—laundry equipment.

Ont., Glencoe—J. G. Best—equipment for drilling oil wells.

Ont., Norwich—W. W. Avey—engine, boiler and complete equipment for new planing mill.

Ont., Penetang—Gropp Bros.—saw mill machinery, boiler, engine, belting, etc.

Que., Sherbrooke—The Canadian Brakeshoe Co., Ltd., N. J. Holden-Holden Co., Ltd., 354 St. James St., Montreal, Purch. Agt.—foundry equipment.

Metal Working Shops

NEW ENGLAND STATES

Conn., Bridgeport—Estate of S. H. Wheeler, 1188 Main St., is having revised plans prepared for the construction of a 3-story, 90 x 120 ft. garage on Middle and Gold Sts.—C. F. Baron, 79 Sage St., Archt. Noted Aug. 4.

Conn., Danbury—H. Dick, 140 Main St., plans to construct a 1-story, 100 x 100 ft. garage on Main St. Estimated cost, $40,000. Architect not selected.

Conn., East Hartford (Hartford P. O.)—H. E. Bidwell, 209 State St., Hartford, is having plans prepared for the construction of a 1-story, 50 x 122 ft. and 20 x 122 ft. garage on Connecticut Blvd. here. Estimated cost, $40,000. Associated Architectural & Eng. Co., 145 State St., Springfield, Mass., Archts. and Engrs.

Conn., East Hartford (Hartford P. O.)—The Charter Oak Machine Co., 438 Asylum St., Hartford, has awarded the contract for the construction of a 1-story, 60 x 100 ft. factory on Connecticut Blvd. here.

Conn., Southington—Peck, Stow & Wilcox Co., Railroad Sq., is receiving bids for the construction of additions to its hardware plant, including a 1-story, 67 x 180 ft. hardening shop, a 2-story, 56 x 156 ft. grinding shop and a 1-story, 59 x 100 ft. forge shop. Estimated cost, $200,000. Private plans. Noted April 21.

Mass. Northampton—Smith College has awarded the contract for the construction of a 2-story, 45 x 120 ft. laundry and garage on the College campus. Estimated cost, $75,000. Noted Dec. 1.

Mass., Southbridge—C. H. Knight, 143 Main St., plans to construct a 1-story garage and sales station on Hamilton St. Estimated cost, $40,000. Architect not selected.

Mass., Springfield—E. T. Davis, 348 Bridge St., has awarded the contract for the construction of a 1-story, 75 x 100 ft. garage on Taylor St. Estimated cost, $45,000.

MIDDLE ATLANTIC STATES

Md., Baltimore—The Continental Garage & Service Corp., 715 Gaither Estate Bldg., is having plans prepared for the construction of a 5-story garage and service station on Monument and Howard Sts. J. C. Tolson, Mgr. L. L. Wagner, Union Trust Bldg., Archt.

N. J., Trenton—E. R. Huddy, 755 Cass St., plans to construct a 2-story, 40 x 100 ft. sheet metal plant on Lexington St. Estimated cost, $25,000.

N. Y., Long Island City—The Interstate Land Holding Co., c/o F. S. Parker, Archt. and Engr., 44 Court St., Brooklyn, has awarded the contract for the construction of a 2-story service station on William and 13th Sts. here. Estimated cost, $100,000. Noted June 16.

N. Y., New York—A. Lewinsohn & Sons, 61 Bway., will soon receive bids for the construction of a 2-story, 50 x 60 ft. garage on 185th St. and Bway. Estimated cost, $90,000. J. DeHart, 1041 Fox St., Archt. and Engr.

Pa., Turtle Creek—Struble & Riley have had plans prepared for the construction of a 2-story, 76 x 175 ft. auto service and sales station. Estimated cost, $150,000. S. C. Richards & Co., 430 Library St., Braddock, Archts.

Pa., Washington—The Tyler Pipe & Tube Co. has awarded the contract for the construction of a 1-story, 20 x 50 ft. boiler plant and 50 x 50 ft. gas producer plant. Estimated cost, $50,000. Noted Dec. 8.

MIDDLE WEST STATES

Ill., Decatur—C. A. Starr, 137 Park Pl., plans to construct a 1-story, 75 x 162 ft. auto repair shop, sales office and storage building. Estimated cost, $40,000. Architect not selected.

Ill., Rockford—The Allen Ice Cream Co., 327 South Winnebago St., is having plans prepared for the construction of a 2-story garage and warehouse. Estimated cost, $46,000. Peterson & Johnson, 406 Swedish-American Bank Bldg., 5th and 7th Sts., Archts.

Ill., Rockford—G. C. Brown and W. C. Gridley, 1826 Hoffman Blvd., are having plans prepared for the construction of a 1-story, 60 x 145 ft. garage, a 35 x 60 ft. repair shop and a 20 x 30 ft. boiler plant on Auburn Ave. Estimated cost, $75,000. C. E. Wolfley, 610 Steward Bldg., Archt.

Ind., Bloomington—W. C. Hottle, R. C. Wiles and K. C. May, are having plans prepared for the construction of a 2-story, 87 x 130 ft. garage and sales building on North College Ave. Estimated cost, $150,000. J. E. Kopf & Woolling, 402 Ind. Pythian Bldg., Indianapolis, Archts.

Ind., Mishawaka—The Lock Joint Tube Co. is having plans prepared for the construction of a 1-story, 45 x 90 ft. factory for the manufacture of metal products. Estimated cost, $30,000. Private plans.

Ind., South Bend—The Twentieth Century Garage, 121 South Lafayette St., is having plans prepared for the construction of a 2-story, 60 x 160 ft. garage. Estimated cost, $150,000. Austin & Shambleau, 111 North Lafayette St., Archts.

Mich., Ironwood—J. F. Gluck has awarded the contract for the construction of a 2-story, 30 x 115 ft. garage. Estimated cost, $40,000.

O., Cincinnati—J. Steinkamp, Archt., Mercantile Library Bldg. will open bids the end of December for the construction of a 2-story, 158 x 228 ft. garage on Gilbert Ave. and Linton St., for Mason Towle Co., 1038 Gilbert Ave. Estimated cost, $125,000.

O., Cleveland—J. N. Galvin, Society for Savings Bldg., is having plans prepared for the construction of a 1-story, 50 x 100 ft. garage at 6711 Detroit Ave. Estimated cost, $60,000. Private plans.

O., Cleveland—A. Horwitz, Society for Savings Bldg., has awarded the contract for the construction of a 1-story, 90 x 111 ft. garage at 2075 East 77th St. Estimated cost, $40,000.

O., Cleveland—A. Kohn & Sons Investment Co., 2380 Canal Rd., is having plans prepared for the construction of a 3-story commercial building and garage on Chester Ave. and East 20th St. Estimated cost, $40,000. P. Matzinger & Co., Caxton Bldg., Archts.

O., Cleveland—P. Matzinger & Co., Archts., Caxton Bldg., is receiving bids for the construction of a 1-story, 60 x 180 ft. factory on East 72nd St., for the Cleveland Refrigerator Co., 2996 East 72nd St. Estimated cost, $50,000.

O., Cleveland—H. Paley, 10806 Orville Ave., barrel dealer, plans to construct a 2-story, store, apartment and garage on East 105th St., near Superior Ave. Estimated cost, $40,000. Private plans.

Wis., Markesan—Folsom-Miller Co. plans to construct a 2-sory, 50 x 60 ft. washing machine factory. Estimated cost, $20,000. Probably private plans.

WEST OF MISSISSIPPI

Ia., Mason City—The Dennison Garage Co. is having plans prepared for the construction of a 2-story 50 x 130 ft. garage. Estimated cost, $50,000. G. L. Lockhart, 1353 University Ave., St. Paul, Minn., Archt.

Minn., Minneapolis—Potts Motor Co., 1017 4th Ave., S., plans to construct a 2-story garage. Estimated cost, $125,000. Architect not selected.